REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY *(Leave blank)*	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	09/00/93	

4. TITLE AND SUBTITLE

TRIAL BURN SUMMARY REPORT, FOR THE INTERIM RESPONSE ACTION, BASIN F SUBMERGED QUENCH INCINERATION PROJECT, DRAFT FINAL

5. FUNDING NUMBERS

6. AUTHOR(S)

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

ROY F. WESTON, INC.
WEST CHESTER, PA

8. PERFORMING ORGANIZATION REPORT NUMBER

93256R01

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

ROCKY MOUNTAIN ARSENAL (CO.). PMRMA
COMMERCE CITY, CO

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION IS UNLIMITED

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

THIS REPORT CONTAINS INFORMATION RECOMMENDED IN THE DOCUMENT ENTITLED "GUIDANCE ON SETTING PERMIT CONDITIONS AND REPORTING TRIAL BURN RESULTS" (EPA/612/6-89/019), JANUARY 1989, AND HAS BEEN ORGANIZED INTO THE FOLLOWING NINE SECTIONS: (1) SUMMARY. (2) PROCESS OPERATION. (3) SAMPLING AND MONITORING PROCEDURES. (4) ANALYTICAL PROCEDURES. (5) TEST RESULTS. (6) QUALITY ASSURANCE SUMMARY. (7) VISITS AND AUDIT SUMMARY. (8) CLOSURE. (9) CONCLUSIONS.

14. SUBJECT TERMS	15. NUMBER OF PAGES
QA/QC, SAMPLING METHODS, ANALYTICAL METHODS, EQUIPMENT, IRA F	16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
UNCLASSIFIED			

93256701

PROGRAM MANAGER FOR
ROCKY MOUNTAIN ARSENAL

INTERIM RESPONSE ACTION

BASIN F LIQUID INCINERATION PROJECT

DRAFT FINAL

TRIAL BURN REPORT

VOLUME III

SEPTEMBER 1993

WESTON
MANAGERS DESIGNERS/CONSULTANTS

C1209c

TRIAL BURN SUMMARY REPORT
FOR THE INTERIM RESPONSE ACTION
BASIN F SUBMERGED QUENCH INCINERATION PROJECT

VOLUME III

Prepared by:

ROY F. WESTON, INC.
1 Weston Way
West Chester, PA 19380

DRAFT FINAL
September 1993

September, 1993

APPENDIX B

SQI TRIAL BURN REPORT

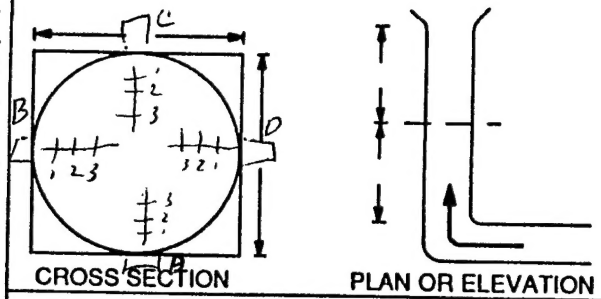
TABLE OF CONTENTS

(3,2) 1
81/183

SHEET 1 OF 2

CLIENT RMM - SQF
PLANT SQF
LOCATION STACK
OPERATOR M. Collom
RUN NO. ONE DATE 6-10-93
AMBIENT TEMP. (deg F) 66°
BARO. PRESS. (in Hg) 24.79
METER BOX NO. Meter #16
METER BOX ΔH@ 1.942
METER BOX CAL. (Y) .9923
PROBE LENGTH (ft) 30"
PROBE LINER MATERIAL BORO
PROBE HEATER SETTING 20
K FACTOR (3.22) (3.17) (3.19) (3.21)
76° 25" Hg (67/181) (72/183) (76/184)

EPA METHOD 0050 FIELD DATA FORM



LEAK CHECKS
PITOT TUBE: INITIAL Good FINAL See
METHOD THREE: INITIAL Good FINAL See

PITOT TUBE IDENTIFICATION NO. P106
PITOT TUBE CAL. FACTOR (C_p) .840
NOZZLE IDENTIFICATION NO. 363
AVG. NOZZLE DIAMETER (D), in .363
PYROMETER IDENTIFICATION NO. 16
THERMOCOUPLE IDENTIFICATION NO. 76
ASSUMED MOISTURE, % 62
ASSUMED TEMPERATURE, deg F 181
STATIC PRESSURE (P_{static}), in H_2O -.35
INITIAL LEAK RATE .007 @ 15 in Hg
MID-POINT LEAK RATE .005 @ 10 in Hg
FINAL LEAK RATE .008 @ 10 in Hg
FILTER NO. 1417

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE INLET (deg F)	DRY GAS METER TEMPERATURE OUTLET (deg F)	SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F)	FILTER BOX TEMP. (deg F)	
	0	0745.30			473.372					Probe		
A 1	5		.42	1.30	476.73	72	71	182	2	56 / 194	248	
1	10		.35	1.10	479.90	74	71	183	2	45 / 186	249	+.3
2	15		.53	1.70	483.59	76	72	183	2	45 / 222	250	
2	20		.52	1.70	487.37	78	73	184	2	43 / 236	250	
3	25		.61	1.90	491.37	80	73	183	2	44 / 243	251	+.6
3	30	815	.58	1.90	495.297	81	74	182	3	44 / 241	256	
			(.7082843)	(1.60)	(21.925)	(74.583)		(182.8335)				
	0	0830	—	—	495.674	—	—	—	—	—	—	
B 1	5		.47	1.50	499.32	79	76	183	3	51 / 224	250	
1	10		.42	1.30	502.75	82	77	183	3	45 / 228	249	-.0
2	15		.60	1.90	506.73	83	78	184	3	44 / 225	250	
2	20		.59	1.90	510.55	84	78	184	3	45 / 212	250	-.1
3	25		.62	2.01	514.68	84	78	184	4	45 / 219	249	
3	30	0900	.72	2.34	518.960	83	77	184	5	45 / 226	249	
					(23.286)	(79.9166)		(183.666)				
	TOTAL θ		AVG. $\sqrt{\Delta p}$ (0.754983)	AVG. ΔH (1.825)	TOTAL V_m	AVG. T_m		AVG. T_s	MAX. VAC.	MAX. TEMP.	MIN. MAX.	

COMMENTS: O_2 3.5% CO_2 10% (Port A Leak Final .003 @ 6" Hg (Port B .015 @ 15" Inl / .005 @ 10" Hg)
(Port C .017 @ 15 Inl Final .007 @ 10" Hg)

g:\shared\airteam\forms\0050FDF1 Dr+W

CLIENT RMA - SQT
PLANT SQT
LOCATION

EPA METHOD 0050 FIELD DATA FORM

OPERATOR McCollum SHEET 2 OF 2
RUN NO. ONE DATE 6/10/93
K FACTOR 3.25 13.28 13.29

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE INLET (deg F)	DRY GAS METER TEMPERATURE OUTLET (deg F)	SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F)	FILTER BOX TEMP. (deg F)	
	0	0917			519.314							
C 1	5		.41	1.33	522.79	78	76	182	5	52/271	251	
1	10		.38	1.23	526.00	82	78	184	5	48/245	250	
2	15		.45	1.46	529.63	83	78	184	5	48/234	250	
2	20		.52	1.69	533.17	84	78	183	6	48/232	249	-.13
3	25		~~.55~~	1.78	536.90	87	81	182	7	50/232	252	
3	30	0947	.55	1.79	540.834	88	81	183	8	51/232	252	
			(.6904105)	(1.5466)	(21.520)	(81.166)		(183)				
	0	1002	—	—	541.174	—	—	—	—	—	—	
D 1	5		.31	1.01	544.23	88	85	184	5	66/253	250	
1	10		.29	.94	547.08	91	86	184	5	50/251	250	
2	15		.41	1.34	550.42	93	87	184	7	49/249	252	
2	20	*	.50	1.64	553.913/554.36	94	88	184	8	51/246	252	-.17
3	25		.50	1.64	558.01	92	89	184	7	59/275	253	
3	30	10:41	.61	2.00	562.082	94	89	184	9	52/222	249	
			(0.660807)	(1.42833)	(20.461)	(89.666)		(184)				
					87.391		81.333	183.38				
	Ave =	.700269		1.60	%O2 =	63.1						
					ACFM =	31300						
					SCFM =	7845						
					R% =	100.4						
					Vm std =	70.35						
	TOTAL θ	.700269	AVG. $\sqrt{\Delta p}$ 0.703644	AVG. ΔH 1.5999	TOTAL V 87.391	AVG. T_m 81.3329		AVG. T_s 183.3748	MAX. VAC. 9	MAX. TEMP. 275	MIN. 248 MAX. 253	

COMMENTS: Pre+ 0 In+.008 @ 15" Hg * Stop 1022 Leak ✓ .005 @ 8 .015 @ 15" Hg Start+ 554.161 10:30
Final .008 @ 10" Hg

EPA METHOD 0050 HYDROCHLORIC ACID SAMPLE RECOVERY AND INTEGRITY DATA FORM

Plant RMA - SQI Sample Date 6-10-93
Sample Location Stack Run Number ONE
Sample Recovery Person JPO Recovery Date 6-10-93
Filter # 1417

628.
926
805
423
2782

MOISTURE

Impingers

	0.1N H_2SO_4	0.1N NaOH	Silica Gel
Final volume (wt)	2782 ml	213 ml	Final wt 321 g ____ g
Initial volume (wt)	250 ml	200 ml	Initial wt 300 g ____ g
Net volume (wt)	2532 ml	13 ml	Net wt ____ g ____ g

Total moisture 2532 + 13 + 21 = 2566
Color of silica gel blue
Description of impinger water all clear

Front half acetone
Filter

RECOVERED SAMPLE
RMA-TBURN-MSO-RN1-FHA
RMA-TBURN-MSO-RN1-FILT ✓✓

Blank 0.1N H2SO4 container number ____ Sealed ____
Blank 0.1N NaOH container number ____ Sealed ____
Blank distilled water container number ____ Sealed ____

Description of particulate on filter very light tan

0.1N H_2SO_4 Impingers container number RMA-TBURN-MSO-RN1-H_2SO_4 Liquid level marked? ✓✓
0.1N NaOH Impingers container number RMA-TBURN-MSO-RN1-NaOH Liquid level marked? ✓✓
Samples stored and locked ✓JPO
Remarks: H_2SO_4 TSV = 3000. ml

Date of laboratory custody ____
Laboratory personnel taking custody ____
Remarks: ____

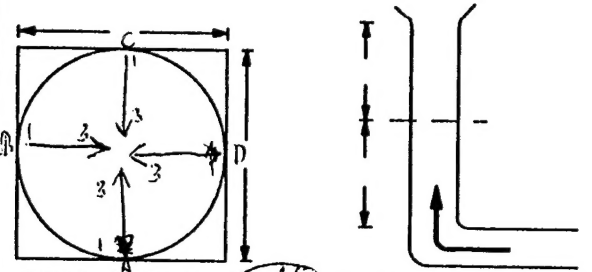
120.
68.9

WESTON

SHEET 1 OF 3

CLIENT RMA-SOF
PLANT SOF
LOCATION STACK
OPERATOR FRITZ
RUN NO. ONE DATE 6-10-93
AMBIENT TEMP. (deg F) 75°F
BARO. PRESS. (in Hg) 24.79
METER BOX NO. 15
METER BOX ΔH@ 2.010
METER BOX CAL. (Y) .9954
PROBE LENGTH (ft) 30"
PROBE LINER MATERIAL BORO
PROBE HEATER SETTING 25
K FACTOR 2.87

EPA METHOD 0010 FIELD DATA FORM



CROSS SECTION (Ladder) PLAN OR ELEVATION

LEAK CHECKS
PITOT TUBE: INITIAL Good FINAL Good
METHOD THREE: INITIAL Good FINAL Good

PITOT TUBE IDENTIFICATION NO. P64
PITOT TUBE CAL. FACTOR (C_p) .840
NOZZLE IDENTIFICATION NO. Glass 355
AVG. NOZZLE DIAMETER (D), in .355
PYROMETER IDENTIFICATION NO. #15
THERMOCOUPLE IDENTIFICATION NO. #1
ASSUMED MOISTURE, % 62
ASSUMED TEMPERATURE, deg F 181
STATIC PRESSURE (P_{static}), in H_2O -.13
INITIAL LEAK RATE .012 @ 15 In Hg
MID-POINT LEAK RATE .012 @ 12 In Hg
FINAL LEAK RATE .009 @ 14 In Hg
XAD NO. RMA-TBURN-M0010-RN1-XAD

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE INLET (deg F)	DRY GAS METER TEMPERATURE OUTLET (deg F)	SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F) Imp Exit	IMPINGER EXIT GAS TEMP. (deg F) Probe Temp	FILTER BOX TEMP. (deg F)	XAD INLET TEMP. (deg F)	
	0	0745			204.402									
D 1	5		.40	1.15	207.34	56	56	184	3.5	65	248	256	65	
1	10		.37	1.06	210.33	60	57	184	4.0	47	242	256	66	
1	15		.39	1.12	213.62	62	58	185	4.0	46	247	254	66	
1	20		.41	1.18	216.37	64	59	185	4.5	46	241	254	67	-.10
2	25		.46	1.38	219.75	65	60	184	4.5	46	238	255	66	
2	30		.47	1.35	223.05	68	61	184	5.0	47	240	256	67	
2	35		.46	1.32	226.21	69	62	185	5.5	48	239	253	67	
2	40		.47	1.35	229.50	71	64	186	6.0	48	240	257	68	
3	45		.55	1.58	233.11	70	63	184	6.5	48	239	255	66	-.15
3	50		.55	1.58	236.61	71	64	185	6.5	50	239	255	66	
3	55		.53	1.52	240.15	73	66	185	6.5	49	240	256	67	
3	60	0845	.53	1.52	243.702	73	66	184	7.0	46	240	255	66	
					Leak Check	.04 @ 10" Hg								
	0	0923			244.007									
A 1	5		.39	1.12	247.000	65	65	185	5.5	64	236	254	64	
1	10		.41	1.18	250.00	69	67	185	6.0	45	238	256	65	-.10
1	15		.39	1.12	253.20	70	67	185	6.0	45	236	256	67	
	TOTAL θ		AVG. $\sqrt{\Delta p}$	AVG. ΔH	TOTAL V_m	AVG. T_m		AVG. T_s	MAX. VAC.	MAX. TEMP.		MIN. MAX.	MAX. TEMP.	

COMMENTS: 27

WESTON

CLIENT RMA-SOI
PLANT SOI
LOCATION STACK

EPA METHOD 0010 FIELD DATA FORM

OPERATOR FRITZ
RUN NO. ONE
K FACTOR 2.87, 2.92

DATE 6-10-93

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE		SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F)		FILTER BOX TEMP. (deg F)	XAD INLET TEMP. (deg F)	
						INLET (deg F)	OUTLET (deg F)			Imp Exit	Probe Temp			
	15													
1	20		.39	1.12	256.38	73	68	185	6.0	47	240	257	67	
2	25		.47	1.35	259.50	76	70	186	6.5	49	244	258	67	
2	30		.49	1.41	262.96	79	72	186	7.5	49	245	257	68	
2	35		.50	1.44	266.49	80	73	185	8.0	50	246	257	68	-.1
2	40		.46	1.32	269.92	82	74	185	7.5	51	246	257	65	
3	45		.52	1.49	273.40	84	77	185	8.0	51	247	257	63	
3	50		.52	1.49	276.93	86	79	186	8.0	51	249	255	64	
3	55		.54	1.55	280.52	88	80	185	9.0	51	249	258	66	
3	60	1023	.52	1.49	284.110	88	80	184	9.0	52	248	254	65	-.1
					Leak Check	.012 @	12" Hg							
	0	1057			284.452									
B 1	5		~~.32~~ .35	1.01	287.35	77	77	180	6.0	48	245	247	55	
1	10		.36	1.05	290.39	78	78	182	6.0	45	245	250	56	
1	15		.36	1.05	293.38	78	78	182	6.0	44	243	254	56	
1	20		.35	1.02	296.37	79	78	185	6.0	48	240	257	60	-.05
2	25		.48	1.40	299.75	82	80	186	8.0	51	249	257	65	
2	30		.46	1.34	303.18	83	80	186	8.0	51	250	258	67	
2	35		.47	1.37	306.60	84	81	185	8.0	51	250	258	66	
2	40		.46	1.34	309.95	85	81	185	8.5	50	254	257	64	
3	45		.54	1.58	313.62	86	82	185	10.0	54	252	255	66	
3	50		.55	1.61	317.29	83	79	184	10.0	53	249	254	67	
3	55		.52	1.52	321.00	81	78	181	10.0	56	243	252	68	-.15
3	60	1157	.52	1.52	324.660	84	81	184	10.0	54	243	254	66	
					Leak check	.012 @	13" Hg							
	0	1401			325.268									
C 1	5		.41	1.20	328.40	78	79	183	6.0	65	254	255	61	
1	10		.42	1.23	331.68	84	82	186	6.5	49	236	256	65	
1	15		.43	1.26	334.96	86	83	186	6.5	48	237	258	65	
	TOTAL θ		AVG. $\sqrt{\Delta p}$	AVG. ΔH	TOTAL V_m	AVG. T_m		AVG. T_s	MAX. VAC.	MAX. TEMP.		MIN. MAX.	MAX. TEMP.	

COMMENTS:

WESTON

CLIENT RMA - SQI
PLANT SQI
LOCATION STACK

EPA METHOD 0010 FIELD DATA FORM

OPERATOR FRITZ
RUN NO. ONE
K FACTOR 2.95

SHEET 3 OF 3
DATE 6-10-93

TRAVERSE POINT NUMBER	SAMPLING TIME (min) 15	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE INLET (deg F)	DRY GAS METER TEMPERATURE OUTLET (deg F)	SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F) Imp Exit	IMPINGER EXIT GAS TEMP. (deg F) Probe Temp	FILTER BOX TEMP. (deg F)	XAD INLET TEMP. (deg F)
1	00		.44	1.29	338.35	88	84	185	7.0	48	240	257	66
2	25		.46	1.36	341.63	90	86	186	7.5	50	246	259	64
2	30		.48	1.42	345.10	82	79	179	8.0	42	240	250	60
2	35		.50	1.48	348.65	81	80	183	8.0	46	239	252	58
2	40		.47	1.39	352.14	84	81	185	8.5	51	239	257	61
3	45		.53	1.56	355.71	83	81	182	9.0	50	237	255	66
3	50		.52	1.53	359.27	84	81	184	10.0	51	237	257	65
3	55		.53	1.56	362.85	80	79	183	10.0	51	236	255	64
3	60	1501	.49	1.45	366.385	83	81	185	11.0	61	235	257	66
					Leak Check	.009 @ 14" Hg							
	TOTAL θ		.680311 SDC AVG. $\sqrt{\Delta p}$ .683116	SDC AVG. ΔH 1.34854	TOTAL V_m 160.728	SDC AVG. T_m 75.646	SDC	SDC AVG. T_s 184.354	SDC MAX. VAC.	MAX. TEMP.	MIN. MAX.	MAX. TEMP.	

COMMENTS:

EPA METHOD 0010
SAMPLE RECOVERY AND INTEGRITY DATA FORM

Plant RMA-SOI
Sample Location SMALL
Sample Recovery Person JDD
Sample Date 6-10-93
Run Number ONE
Recovery Date 6-10-93

915
923
565
934
962
556
4855

MOISTURE

	Impingers	Condensor	Silica Gel
Final volume (wt)	4855 ml	ml	Final wt 348 g g
Initial volume (wt)	200 ml	ml	Initial wt 300 g g
Net volume (wt)	4655 ml	ml	Net wt 48 g g

Total moisture 4655 + 48 = 4703
Color of silica gel blue 60%
Description of impinger water all clear

RECOVERED SAMPLE

Blank Filter container number _____ Sealed _____
Blank XAD container number _____ Sealed _____
Filter/~~XAD~~ container number RMA-TBURN-M0010-RN1-FILT Sealed ✓
~~Filter~~/XAD container number RMA-TBURN-M0010-RN1-XAD Sealed ✓
Filter/XAD container number _____ Sealed _____
Filter/XAD container number _____ Sealed _____
Description of particulate on filter _____
(6 of 6)
Condenser water container number RMA-TBURN-M0010-RN1-COND Liquid level marked? ✓
Front-half solvent
rinse container number RMA-TBURN-M0010-RN1-FHS Liquid level marked? ✓
Impinger contents and back-half
water rinse container number RMA-TBURN-M0010-RN1-COND Liquid level marked? ✓
Back-half solvent
rinse continer number RMA-TBURN-M0010-RN1-BHS Liquid level marked? ✓
Water blank container number _____ Liquid level marked? _____
Solvent blank container number _____ Liquid level marked? _____

Samples stored and locked OK JDD 6/10/93 maintained cold
Remarks: _____

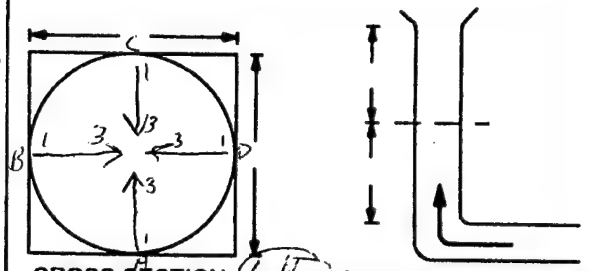
Date of laboratory custody 6-11-93
Laboratory personnel taking custody _____
Remarks: _____

WESTON

SHEET 1 OF 3

EPA METHOD 23 FIELD DATA FORM

CLIENT RMA - SOF
PLANT SOF
LOCATION STACK
OPERATOR DECARLO
RUN NO. ONE DATE 6-10-93
AMBIENT TEMP. (deg F) 75
BARO. PRESS. (in Hg) 24.79
METER BOX NO. 12
METER BOX ΔH@ 2.012
METER BOX CAL. (Y) 1.010
PROBE LENGTH (ft) 30"
PROBE LINER MATERIAL BORO
PROBE HEATER SETTING 250
K FACTOR 3.08 2.96 3.02 3.04



PITOT TUBE IDENTIFICATION NO. P52
PITOT TUBE CAL. FACTOR (C_p) .840
NOZZLE IDENTIFICATION NO. BORO .355
AVG. NOZZLE DIAMETER (D), in. .355
PYROMETER IDENTIFICATION NO. 12
THERMOCOUPLE IDENTIFICATION NO. —
ASSUMED MOISTURE, % 62
ASSUMED TEMPERATURE, deg F 181
STATIC PRESSURE (P_{static}), in H_2O ~~-.35~~ -.13
INITIAL LEAK RATE .012 @ 15 in Hg
MID-POINT LEAK RATE .015 @ 15 in Hg
FINAL LEAK RATE .010 @ 7 in Hg
XAD NO. RMA-TBORN-M23-RNE-XAD

LEAK CHECKS
PITOT TUBE: INITIAL GOOD FINAL GOOD
METHOD THREE: INITIAL GOOD FINAL GOOD

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE INLET (deg F)	DRY GAS METER TEMPERATURE OUTLET (deg F)	SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F)	IMPINGER EXIT GAS TEMP. (deg F) Probe	FILTER BOX TEMP. (deg F)	XAD INLET TEMP. (deg F)	
	0	07:45			450.635									10% CO 3.5% O2
C 1	5		.49	1.45	454.15	58	57	184	4	65	225	251	65	~~3.08~~ 2.96
1	10		.47	1.39	457.64	62	58	183	4	44	229	258	65	
1	15		.47	1.39	460.07	64	60	184	4	43	236	249	66	
1	20		.47	1.39	464.31	66	61	184	4.5	43	237	249	66	.11
2	25		.62	1.87	468.41	67	62	184	5.5	44	244	248	66	3.02
2	30		.60	1.81	472.41	69	63	184	5.5	45	254	248	66	
2	35		.60	1.81	476.35	71	64	184	5.5	44	247	248	62	
2	40		.59	1.78	480.32	73	64	185	5.5	46	248	248	64	
3	45		.59	1.78	484.12	73	65	184	5.5	47	245	247	66	
3	50		.57	1.72	487.99	73	67	184	5.5	47	247	250	62	.14
3	55		.56	1.69	491.78	75	68	184	5.5	47	250	249	57	
3	60	Del. 45	.58	1.75	495.638	75	68	184		46	249	248	59	
					LEAK CHECK OK @ 15" Hg @ .012									3.
	0	09:33	~~.43~~ .52 SD	~~1.30~~ SD	495.946									
B 1	5		.43	1.30	499.28	68	67	184	5.0	45	254	247	51	3.01
1	10		.46	1.39	502.76	70	68	184	5.0	43	234	247	56	
1	15		.44	1.32	506.21	74	69	184		44	239	247	60	3.04
	TOTAL θ		AVG. $\sqrt{\Delta p}$	AVG. ΔH	TOTAL V_m	AVG. T_m		AVG. T_s	MAX. VAC.	MAX. TEMP.		MIN. MAX.	MAX. TEMP.	

COMMENTS:

WESTON

EPA METHOD 23 FIELD DATA FORM

CLIENT RMA - SQF
PLANT SQF
LOCATION 30th

OPERATOR DeCarlo
RUN NO. ONE
K FACTOR 3.04 | 3.06

SHEET 2 OF 3
DATE 6-10-93

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE INLET (deg F)	DRY GAS METER TEMPERATURE OUTLET (deg F)	SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F)	FILTER BOX TEMP. (deg F)	XAD INLET TEMP. (deg F)
	15				506.21							
3.04 D 1	20		.44	1.34	509.65	77	70	184	5.0	46	241	59
2	25		.49	1.49	513.20	79	72	184	5.5	48	248	60
2	30		.49	1.49	516.74	81	73	184	6.0	47	252	62
2	35		.49	1.49	520.3	83	75	185	6.0	47	251	62
2	40		.47	1.43	524.12	84	76	184	6.0	47	251	62
3	45		.50	1.52	527.52	86	78	183	6.5	47	251	62
3	50		.52	1.59	531.21	88	80	185	7.0	49	259	63
3	55		.56	1.71	534.97	89	81	186	8.5	49	243	66
3.09 3	60	10:23	.53	1.62	538.724	89	82	184	9.0	49	236	66
					LEAK Check OK @ .013 @ 11" Hg							
	0	10:57			539.236							
3.09 A 1	5		.39	1.20	542.54	85	84	183	7.5	49	225	247	30
3.09 1	10		.38	1.16	545.77	80	81	182	7.5	48	225	245	54
1	15		.39	1.19	548.97	80	80	183	8.5	45	246	252	56
1	20		.37	1.14	552.24	80	80	183	8.5	48	261	253	60
2	25		.39	1.19	555.41	83	81	184	8.5	50	257	254	63
2	30		.39	1.19	558.62	84	84	184	9.5	51	240	255	63
3.09 2	35		.39	1.21	561.87	86	82	184	10.0	53	236	258	65
2	40		.39	1.21	565.14	87	83	184	11.5	55	236	257	60
3	45		.47	1.45 Start	568.989 / 566.4	87	83	184	14.5	54	236	256	56
3	50		.43	1.33	572.14	85	84	184	4.5	55	253	257	54
3	55		.44	1.36	575.61	87	83	184	5.0	50	237	256	64
3	60	~~11:10~~ 11:57	.46	1.42	579.209	85	83	184	5.0	50	229	253	65
					LEAK Check OK .016 @ 15 (27.32)							
	0	14:01			579.864							
3.09 D 1	5		.44	1.36	583.29	80	80	181	5.0	59	223	251	65
-.12 1	10		.44	1.36	586.75	85	83	186	5.0	51	250	255	67
1	15		.45	1.39	590.34	88	84	185	5.0	50	260	257	66
	TOTAL θ		AVG. $\sqrt{\Delta p}$	AVG. ΔH	TOTAL V_m	AVG. T_m		AVG. T_s	MAX. VAC.	MAX. TEMP.	MIN. MAX.	MAX. TEMP.

COMMENTS: Filter Change @ 11:28 @ 565.989 / LEAK Check OK @ 14.5" @ .014. Start @ 566.408 @ 11:57
@ Port A 568.77 Changed Nozzle

WESTON

EPA METHOD 23 FIELD DATA FORM

CLIENT RMA - SQI
PLANT SQI
LOCATION STACK

OPERATOR DeCarlo
RUN NO. ONE
K FACTOR 3.12 \ 3.09

SHEET 3 OF 3
DATE 6-10-93

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE INLET (deg F)	DRY GAS METER TEMPERATURE OUTLET (deg F)	SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F)	Probe	FILTER BOX TEMP. (deg F)	XAD INLET TEMP. (deg F)
	15				590.34								
3.12 D 1	20		.48	1.48	594.21	93	87	185	5.5	51	262	253	66
2	25		.35	1.09	597.34	94	88	185	5.0	53	258	254	64
3.09 2	30		.36	1.12	600.63	92	87	184	5.0	52	258	257	60
2	35		.39	1.22	603.98	85	84	182	5.0	51	252	250	60
2	40		.36	1.11	607.26	86	84	183	5.0	52	253	251	57
3	45		.44	1.36	610.79	85	84	183	5.5	52	252	251	55
3	50		.44	1.36	614.28	85	83	183	5.5	50	249	250	60
3	55		.43	1.33	618.01	83	82	183	5.5	50	248	250	62
3	60	15:01	.39	1.21	621.258	84	83	183	5.5	53	240	255	63
				Leak	Check OK	.010 @	7" Hg						

TOTAL θ		AVG. $\sqrt{\Delta p}$	AVG. ΔH	TOTAL V_m	AVG. T_m	AVG. T_s	MAX. VAC.	MAX.	TEMP.	MIN. MAX.	MAX. TEMP.
240		.67944 WF	1.41604 WF	168.721 WF	77.968 WF	183.895 WF	14.5	65	275		

COMMENTS: SQI nozzle pulled and cleaned at 1200 - test delayed until 1400

WESTON
MANAGERS DESIGNERS/CONSULTANTS

EPA METHOD 23 (PCDD/PCDF)
SAMPLE RECOVERY AND INTEGRITY DATA FORM

Plant RMA-SQE
Sample Location SOUTH
Sample Recovery Person JDO
Sample Date 6-10-93
Run Number ONE
Recovery Date 6-10-93

600
983
988
936
947
597
5051

MOISTURE

	Impingers			Silica Gel	
Final volume (wt)	5051 ml	ml	Final wt	341 g	g
Initial volume (wt)	200 ml	ml	Initial wt	300 g	g
Net volume (wt)	4951 ml	ml	Net wt	41 g	g

Total moisture 4951 + 41 = 4892
Color of silica gel blue 70%
Description of impinger water all clear

RECOVERED SAMPLE

Blank Filter container number _____ Sealed ____
Filter container number RMA-TBURN-M23-RN1-FILT Sealed ✓
Blank XAD container number _____ Sealed ____
XAD container number RMA-TBURN-M23-RN1-XAD Sealed ✓
Description of particulate on filter _____
Front-half acetone rinse container number RMA-TBURN-M23-RN1-FHS Liq. lev. marked? ✓
Front-half methylene chloride rinse container number " Liq. lev. marked? ____
(6 of 6) Back-half water container number RMA-TBURN-M23-RN1-COND Liq. lev. marked? ✓
Back-half methylene chloride solution rinse RMA-TBURN-M23-RN1-BHS Liq. lev. marked? ✓
Toluene QA / QC rinse RMA-TBURN-M23-RN1-TOL Liq. lev. marked? ✓
Blank distilled water container number _____ Liq. lev. marked? ____
Blank acetone container number _____ Liq. lev. marked? ____
Blank methlylene choride container number _____ Liq. lev. marked? ____
Samples stored and locked ✓ 4c JDO maintained cold
Remarks: _____

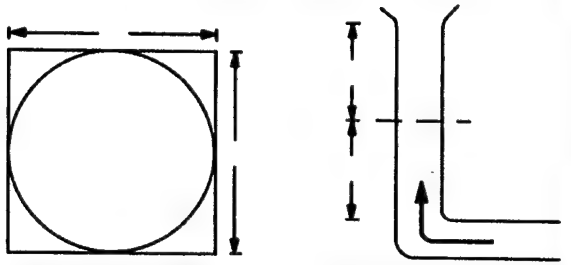
Date of laboratory custody _____
Laboratory personnel taking custody _____
Remarks: _____

WESTON

SHEET 1 OF 2

Cr +6 FIELD DATA FORM

CLIENT RMA - JQI
PLANT SQI
LOCATION STACK
OPERATOR HILL
RUN NO. ONE DATE 6-10-93
AMBIENT TEMP. (deg F) 75-80
BARO. PRESS. (in Hg) 24.79
METER BOX NO. NUTECH 16
METER BOX ΔH@ 1.942
METER BOX CAL. (Y) .9923
PROBE LENGTH (ft) 30"
PROBE LINER MATERIAL TEFLON
PROBE HEATER SETTING N/A
K FACTOR 3.0 900°M 181°TS



LEAK CHECKS
PITOT TUBE: INITIAL ✓ FINAL ✓
METHOD THREE: INITIAL ✓ FINAL ✓

PITOT TUBE IDENTIFICATION NO. PS3
PITOT TUBE CAL. FACTOR (C_p) .84
NOZZLE IDENTIFICATION NO. CR16 355A
AVG. NOZZLE DIAMETER (D), in .354
PYROMETER IDENTIFICATION NO. NUTECH 16
THERMOCOUPLE IDENTIFICATION NO.
ASSUMED MOISTURE, % 62
ASSUMED TEMPERATURE, deg F 131
STATIC PRESSURE (P_{static}), in H_2O -.24
INITIAL LEAK RATE .006 @ 15 in Hg
MID-POINT LEAK RATE — @ — in Hg
FINAL LEAK RATE .003 @ 10 in Hg

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE INLET (deg F)	DRY GAS METER TEMPERATURE OUTLET (deg F)	SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F)	KOH RECIR. RATE (ml/min)
	0	1130			562.823						
C 1	5		.43	1.29	566.1	86	85	183	3.0	66	50
1	10		.47	1.41	569.4	88	86	183	5.0	54	
2	15		.48	1.44	573.1	89	86	183	7.0	55	
2	20	STATIC -.24	.48	1.44	576.8	90	86	182	7.0	60	
3	25		.44	1.32	580.2	91	86	182	6.0	61	
3	30	1200	.43	1.29	583.581	91	86	183	6.0	58	
		*		LC Good @		10" Hg					
	0	1359			583.834						
DA 1	5		.44	1.32	587.1	94	87	182	3.0	68	50
1	10		.49	1.47	590.3	96	84	184	5.0	49	
2	15		.42	1.26	593.9	90	86	185	6.0	50	
2	20		.44	1.32	597.3	92	86	184	6.0	52	
3	25		.36	1.08	600.5	94	87	193	6.0	59	
3	30	1429	.34	1.02	603.509	96	89	184	5.0	63	
				LC	Good	@ 8" Hg					
	TOTAL θ		AVG. $\sqrt{\Delta p}$	AVG. ΔH	TOTAL V_m	AVG. T_m		AVG. T_s	MAX. VAC.	MAX. TEMP.	

COMMENTS: * NOZZLE CHANGE OUT AT BURNERS ~ 90 MIN. DELAY

g:\shared\airteam\forms\CR6F1.DRW

WESTON

Cr +6 FIELD DATA FORM

CLIENT RMA - SQI
PLANT SQI
LOCATION STACK

OPERATOR JILL
RUN NO. ONE
K FACTOR

SHEET 2 OF 2
DATE 6-10-93

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE INLET (deg F)	DRY GAS METER TEMPERATURE OUTLET (deg F)	SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F)	KOH RECIR. RATE (ml/min)
	0	1440			603.644						
A 1	5		.49	1.47	607.1	87	85	182	4.0	67	50
1	10		.49	1.47	610.16	89	85	182	5.5	58	
2	15		.47	1.41	614.1	89	85	182	7.0	60	
2	20		.47	1.41	617.1	89	85	182	7.0	62	
3	25		.45	1.35	621.0	90	85	182	7.0	65	
3	30	1510	.42	1.26	624.395	93	87	184	7.0	66	—
	35										
	40			LC	626.0 @	8"	Hg				
	0	1522			624.493						
B 1	5		.40	1.20	627.6	87	84	182	4.0	67	50
1	10		.40	1.20	630.8	89	85	183	5.0	56	
2	15		.37	1.11	633.9	91	86	183	6.0	54	
2	20		.36	1.08	637.1	91	86	183	6.0	58	
3	25		.32	.96	639.9	93	87	182	5.0	57	
3	30	1552	.32	.96	643.030	92	87	183	5.0	59	—
					18.537						
					20.751						
					20.758						
					19.675						
											500
	TOTAL θ		AVG. $\sqrt{\Delta p}$	AVG. ΔH	TOTAL V_m	AVG. T_m		AVG. T_s	MAX. VAC.	MAX. TEMP.	
	120		.64993	1.2725	79.721	87.8		182.8			

COMMENTS: FINAL Pit = 1015

EPA Cr^{+6} Method
SAMPLE RECOVERY AND INTEGRITY DATA FORM

Plant RMA - SQI Sample Date 6/10/93

Sample Location STACK Run Number ONE

Sample Recovery Person KH Recovery Date 6/10/93

MOISTURE

Impingers	KOH		Silica Gel	
Final volume (wt)	950 + 950 ml + 880		Final wt 358 g	____ g
Initial volume (wt)	300 + 150 ml + 75		Initial wt 300 g	____ g
Net volume (wt)	2255 ml		Net wt 58 g	____ g

Total moisture 2313

Color of silica gel PINK / BLUE

RECOVERED SAMPLE

on millipore filter after filtration

Description of particulate ✓ LIGHT TO MODERATELY HEAVY

KOH impingers and rinse container number(s) RMA-TBURN-CR6-RNI-KOH (4 OF 4)

Sample Filtered? ✓ Liquid level marked? ✓

Blank KOH container number(s) RMA-TBURN-CR6-SB-KOH Liquid level marked? ✓

Samples stored and locked ✓

Remarks: FINAL PH = 10.5

Date of laboratory custody ____

Laboratory personnel taking custody ____

Remarks: ____

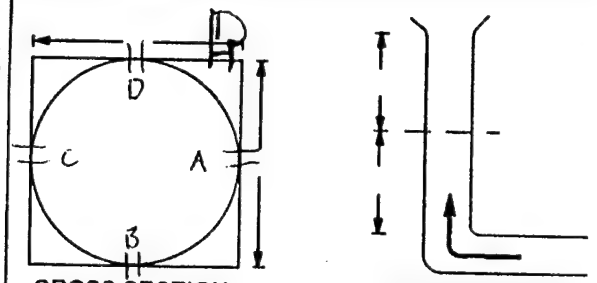
-.35 stick
152 stack temp
62 moisture
65 me

WESTON DESIGNERS & CONSULTANTS

SHEET 1 OF 2

MULTI METALS FIELD DATA FORM

CLIENT RMA - SQF
PLANT SQF
LOCATION STACK
OPERATOR ARB
RUN NO. ONE DATE 6-10-93
AMBIENT TEMP. (deg F) 65°
BARO. PRESS. (in Hg) 24.79
METER BOX NO. 9
METER BOX ΔH@ 1.902
METER BOX CAL. (Y) 1.001
PROBE LENGTH (ft) 30"
PROBE LINER MATERIAL BORO
PROBE HEATER SETTING 22
K FACTOR 3.48 (CF°) 3.56 (80°)



CROSS SECTION

PLAN OR ELEVATION

PITOT TUBE IDENTIFICATION NO. P70
PITOT TUBE CAL. FACTOR (C_p) .840
NOZZLE IDENTIFICATION NO. BORO 375
AVG. NOZZLE DIAMETER (D), in. .375
PYROMETER IDENTIFICATION NO. NJTech #9
THERMOCOUPLE IDENTIFICATION NO. —
ASSUMED MOISTURE, % 62
ASSUMED TEMPERATURE, deg F 181
STATIC PRESSURE (P_{static}), in H_2O -4
INITIAL LEAK RATE .012 @ 15 in Hg
MID-POINT LEAK RATE — @ — in Hg
FINAL LEAK RATE .005 @ 7 in Hg
FILTER NO. MA

LEAK CHECKS
PITOT TUBE: INITIAL Good FINAL
METHOD THREE: INITIAL N/A FINAL N/A

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE INLET (deg F)	DRY GAS METER TEMPERATURE OUTLET (deg F)	SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F)	FILTER BOX TEMP. (deg F)	
	0				377.575							
B 1	5	0745 MT	.53	1.84	381.3	64	61	187	4	64	238	
1	10		.52	1.81	385.2	68	64	185	4	48	239	
2	15		.58	2.02	389.2	73	65	186	5	47	238	
2	20		.60	2.09	393.5	76	66	186	5	48	239	.14
3	25		.65	2.26	397.8	78	67	186	5	47	241	
3	30	0815	.64	2.22	402.176	81	69	186	5	46	241	
					Lc-.005@-6" Hg							
	0	0830	—	—	402.555	—	—	—	—	—	—	
A 1	5		.32	1.11	405.5	76	72	185	4	55	238	
1	10		.32	1.11	408.7	78	73	185	4	50	238	
2	15		.53	1.84	412.7	82	74	186	5	47	239	
2	20		.54	1.92	416.7	83	74	185	5	47	236	.15
3	25		.58	2.06	421.0	83	75	184	5	48	237	
3	30	0900	.58	2.06	425.044	83	75	185	5	49	240	
					Lc-.005@6" Hg							
	TOTAL θ		AVG. $\sqrt{\Delta p}$	AVG. ΔH	TOTAL V_m	AVG. T_m		AVG. T_s	MAX. VAC.	MAX. TEMP.	MIN. MAX.	

COMMENT

CLIENT RMA - SQI
PLANT SQI
LOCATION STACK

MULTI METALS FIELD DATA FORM

OPERATOR ARB
RUN NO. ONE
K FACTOR 3.56 / .80

SHEET 2 OF 2
DATE 6-10-9

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE INLET (deg F)	DRY GAS METER TEMPERATURE OUTLET (deg F)	SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F)	FILTER BOX TEMP. (deg F)
	0	0917			425.370						
D 1	5		.36	1.28	428.6	77	75	184	4	68	239
1	10		.36	1.28	431.7	78	75	184	4	51	239
2	15		.42	1.50	435.4	80	75	185	5	47	240
2	20		.42	1.50	438.9	82	76	185	5	50	238
3	25		.49	1.74	442.8	86	77	184	5	52	242
3	30	0947	.47	1.67	446.855	87	77	184	5	51	242
					LC-.012@6"Hg						
	0	1002	—	—	447.078	—	—	—	—	—	—
C 1	5		.42	1.50	450.3	83	80	183	5	68	240
1	10		.43	1.53	454.0	90	82	183	5	54	240
2	15		.49	1.74	457.9	94	84	184	5	52	241
2	20		.52	1.85	461.9	96	85	184	6	54	239
3	25		.56	1.99	466.0	98	86	182	6	51	239
3	30	1032	.56	1.99	470.200	97	87	182	6	51	240
					LC-.005@6"Hg						
	TOTAL θ 120		AVG. $\sqrt{\Delta p}$ .700509	AVG. ΔH 1.74833	TOTAL V_m 91.757	AVG. T_m 78.5		AVG. T_s 184.6	MAX. VAC. 6	MAX. TEMP. 68	MIN. 236 MAX. 242

COMMENTS

EPA MULTI-METALS
SAMPLE RECOVERY AND INTEGRITY DATA FORM

Plant RMA - SQF
Sample Location STACK
Sample Recovery Person JDO
Filter Number(s) N/A

Sample Date 6-10-93
Run Number ONE
Recovery Date 6-10-93

842
876
852
2570

MOISTURE

Impingers	HNO_3/H_2O_2	Dry Imp. 3/4	$KMNO_4$	Silica Gel
Final vol (wt)	2570 ml	319 ml	223 ml	Final wt 323 g
Initial vol (wt)	200 ml	0 ml	200 ml	Initial wt 300 g
Net volume (wt)	2370 ml	319 ml	23 ml	Net wt 23 g

Total moisture 2712 + 23 = 2735
Color of silica gel blue 20%
Description of particulate light tan
Description of impinger water (condensate/HNO_3) all clear

RECOVERED SAMPLE

Container #

(1) Filter container number RMA-TBURN-MMTL-RN1-FILT Sealed ✓
(2) Front-half acetone container number(s) N/A Liquid level marked? ____
(3) Front-half 0.1N nitric container number (s) RMA-TBURN-MMTL- Liquid level marked? ✓
(4) Back-half condensate impingers (1 through 3) and nitric rinse container number(s) RMA-TBURN-MMTL-RN1-BHN Liquid level marked? ✓ (3 of 3) RN1-FHN
(5A) Impinger 4 condensate and nitric rinse container number(s) RMA-TBURN-MMTL-RN1-Imp4 Liquid level marked? ✓
(5B) $KMnO_4$ impingers 5 and 6 and $KMnO_4$ and water rinse container number(s) RMA-TBURN-MMTL-RN1-KMnO4 Liquid level marked? ✓
(5C) 8NHCl rinse (if required) container number RMA-TBURN-MMTL- Liquid level marked? ✓
(7) Blank acetone container number N/A -RN1-ACL Liquid level marked? ____
(8) Blank 0.1N nitric container number ____ Liquid level marked? ____
(9) Blank nitric/H_2O_2 container number ____ Liquid level marked? ____
(10) Blank $KMNO_4$ container number ____ Liquid level marked? ____
(11) Blank 8N HCl container number ____ Liquid level marked? ____
(12) Blank Filter container number ____ Liquid level marked? ____

Samples stored and locked JDO-04
Date of laboratory custody 6/11/93
Laboratory personnel taking custody ____
Remarks: ____

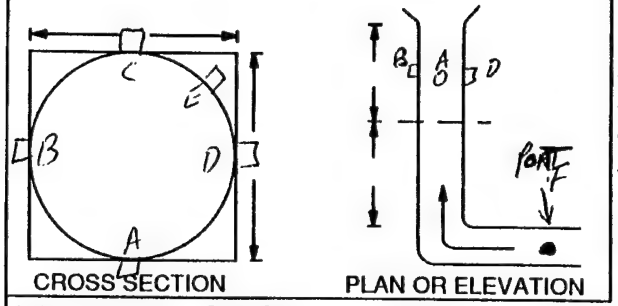
NOTE: Container (6) is the silica gel.

WESTON MANAGERS DESIGNERS/CONSULTANTS

SHEET 1 OF 2

VOST FIELD DATA FORM

CLIENT RMA-3QI
PLANT DENVER COLORADO
LOCATION STACK BREECHING
OPERATOR MILLS
RUN NO. ONE DATE 6/10/93
AMBIENT TEMP. (deg F) 80
BARO. PRESS. (in Hg) 24.79
METER BOX NO. VOST 4
METER BOX ΔH@ N/A
METER BOX CAL. (Y) .9963
PROBE LENGTH (ft) 3 FT.
PROBE LINER MATERIAL BOROSILICATE
PROBE HEATER SETTING > 150°C
K FACTOR N/A



TENAX TUBE SAMPLE NUMBERS
SET ONE RMA-TBURN-MOV30-RN1-TP1 (13940)
SET TWO RMA-TBURN-MOV30-RN1-TP2 (13951)
SET THREE RMA-TBURN-MOV30-RN1-TP3 (13942)
SET FOUR RMA-TBURN-MOV30-RN1-TP4 (13941)
SET FIVE RMA-TBURN-MOV30-RN1-TP5 (13944)
SET SIX RMA-TBURN-MOV30-RN1-TP6 (13943)
STACK BLANK RMA-TBURN-MOV30-BT-TP (13935)

RMA-TBURN-MOV30-RN1-COND 1-4
RMA-TBURN-MOV30-BT-COND

LEAK CHECKS	SET ONE:	SET TWO:	SET THREE:	SET FOUR:	SET FIVE:	SET SIX:
INITIAL:	Good	Good	Good	Good	Good	Good
FINAL:	Good	Good	Good	Good	Good	Good

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	ROTO-METER SETTING	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (liter)	DRY GAS METER TEMPERATURE INLET (deg C)	DRY GAS METER TEMPERATURE OUTLET (deg C)	PROBE TEMP. (deg C)	PUMP VACUUM (in. Hg gauge)	FIRST CONDENS. EXIT GAS TEMP. (deg C)	SECOND CONDENS. EXIT GAS TEMP. (deg C)
PORT F	0	0808			978.188						
	5		80	1.4	983.3	N/A	27	180	5	13	13
	10		78	1.5	988.7		28	177	7.5	10	14
	15		78	1.4	994.5		28	175	8.0	9	13
	20	0828	82	1.5	1000.550		28	179	9.0	8	13
				(1.45)	(22,362)		(27.75)				
	0	0840			01.625						
	5		80	1.4	07.3	N/A	28	182	6.0	13	13
	10		80	1.5	12.8		29	178	6.5	9	13
	15		82	1.5	18.3		30	202	6.5	10	13
	20	0900	80	1.5	24.075		30	192	6.5	9	13
				(1.475)	(22.450)		(29.25)				
	0	0914			25,455						
	5		80	1.5	31.0	N/A	30	178	5.0	13	14
	10		80	1.5	36.7		31	184	7.0	10	14
	15		80	1.5	42.2		30	185	7.0	10	12
	20		80	1.5	47,890		31	187	8.0	9	12
	TOTAL θ			AVG. ΔH (1.50)	TOTAL V_m (22,435)		AVG. T_m (30.50)	AVG. T_s	MAX. VAC.	MAX. TEMP.	MAX. TEMP.

COMMENTS: Probe is Leak checked Before + After Test Run.

g:\shared\milteam\forms\VOSTFD1.DRW

WESTON

VOST FIELD DATA FORM

CLIENT RMA - SQI
PLANT Denver Colorado
LOCATION

OPERATOR Jack Mills
RUN NO. ONE
K FACTOR

DATE 6/10/93

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	ROTO-METER SETTING	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (liters)	DRY GAS METER TEMPERATURE		PROBE TEMP. (deg C)	PUMP VACUUM (in. Hg gauge)	FIRST CONDENS. EXIT GAS TEMP. (deg C)	SECOND CONDENS. EXIT GAS TEMP. (deg C)
						INLET (deg C)	OUTLET (deg C)				
	0	0946			48,945						
	5		82	1.4	54.7	N/A	31	183	3.0	13	14
	10		80	1.5	61.6		31	179	4.0	9	13
	15		78	1.5	65.8		32	182	4.0	9	9
	20	1006	80	1.5	71.395		32	185	4.0	9	9
				1.475	22.450		31.50				
	0	1019			72.420						
	5		85	1.5	78.2	NA	32	182	3.0	11	11
	10		83	1.5	83.8		32	185	4.0	8	10
	15		80	1.5	89.3		32	222	4.0	10	11
	20	1039	78	1.5	94.780		32	220	4.0	10	12
				1.50	22.360		32.00				
	0	1049			95.928						
	5		80	1.5	101.5	NA	34	210	3.5	13	13
	10		80	1.5	107.2		33	200	5.0	10	12
	15		80	1.5	112.6		33	192	5.0	9	11
	20	1109	80	1.5	118.158		33	179	5.0	9	11
				1.50	22.230		33.25				
	TOTAL θ			AVG. ΔH	TOTAL V_m	AVG. T_m		AVG. T_s	MAX. VAC.	MAX. TEMP.	MAX. TEMP.

COMMENTS: Condenser recir. water maintained at 32°F

GAS ANALYSIS DATA FORM

Plant: RMA/SQI
Sample Location: Stack
Date: 10 JUNE 93
Operator: ARB
Sample Type: SINGLE POINT or (MULTIPOINT); GRAB or (INTEGRATED)
Analytical Method: ORSAT
Orsat Leak Check: Good

Run Number	Sample Location/Train ID	% CO2 Reading 1	%O2 Reading 2	%O2 Net (1)	%N2 100 - Reading 2
ONE	Stack / Part. / HCl	~~9.8~~	~~14.0~~	~~4.2~~	
ONE	Stack / Part. / HCl	9.2	13.8	4.6	
ONE	Stack / Part. / HCl	9.3	14.3	5.0	
ONE	Stack / Part. / HCl	9.4	14.2	4.8	
ONE	Stack / Part. / HCl	9.2	14.0	4.8	
Average		(9.275)		(4.80)	
ONE A	Stack / Semi vol	10.2	13.6	3.~~4~~	
		10.0	13.4	3.4	
		10.0	13.5	3.5	
ONE B	Stack / Semi vol	~~10.3~~	~~13.2~~	~~2.9~~	
		10.3	13.7	3.4	
		10.2	13.6	3.4	
		10.1	13.6	~~3.5~~	
	Avg	(10.1)		(3.4)	
ONE	Stack / Cr^{+6}	9.0	14.2	5.2	
		8.9	14.5	5.6	
		9.0	14.5	5.5	
AVERAGES		(9.0)		(5.4)	

%N2 = 100 - (%CO2 + % O2 + %CO)
MWd = 0.440(%CO2) + 0.320(%O2) + 0.280(%N2 + %CO)

(1) Net %O2 = Reading 1 - Reading 2

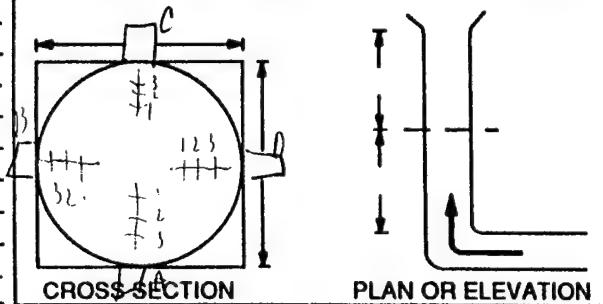
Integrated Bag Limits
CO2 > 4% - 0.3% by vol
<=4% - 0.2% by vol
O2 >= 15% - 0.2% by vol
< 15% - 0.3% by vol

WESTON

SHEET 1 OF 2

EPA METHOD 0050 FIELD DATA FORM

CLIENT RMA-SQI
PLANT SQI
LOCATION Stack 16
OPERATOR McCallum
RUN NO. Two DATE 6/11/93
AMBIENT TEMP. (deg F) 72
BARO. PRESS. (in Hg) 29.57
METER BOX NO. Nutek #16
METER BOX ΔH@ 1.942
METER BOX CAL. (Y) .9923
PROBE LENGTH (ft) 30"
PROBE LINER MATERIAL Boro
PROBE HEATER SETTING 25
K FACTOR 3.21 3.31 3.33
91° 96°



LEAK CHECKS
PITOT TUBE: INITIAL Good FINAL Good
METHOD THREE: INITIAL good FINAL good

PITOT TUBE IDENTIFICATION NO. P-106
PITOT TUBE CAL. FACTOR (C_p) .840
NOZZLE IDENTIFICATION NO .363
AVG. NOZZLE DIAMETER (D), in .363
PYROMETER IDENTIFICATION NO N/A
THERMOCOUPLE IDENTIFICATION NO N/A
ASSUMED MOISTURE, % 62
ASSUMED TEMPERATURE, deg F 183 (PMM)
STATIC PRESSURE (P_{static}), in H_2O -.17 -.19
INITIAL LEAK RATE .014 @ 15 in Hg
MID-POINT LEAK RATE @ in Hg
FINAL LEAK RATE .010 @ 10 in Hg
FILTER NO. 1347

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE INLET (deg F)	DRY GAS METER TEMPERATURE OUTLET (deg F)	SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F)	FILTER BOX TEMP. (deg F)
	0	843			667.595						
C B 1	5		0.49	1.57	671.15	92	90	183	2	66 | 226	260
1	10		0.48	1.58	674.8	94	9	184	2	60 | 231	255
2	15		0.52	1.72	678.7	97	92	184	2	52 | 234	253
2	20		0.60	1.98	682.7	99	93	184	2	53 | 231	251
3	25		0.65	2.15	687.0	100	94	183	3	53 | 232	251
3	30	914	0.65	2.16	691.339	102	94	183	3	53 | 250	252
					23.744						
				port C	Leak Check	.008@	5"Hg				
D	0	9:22	port D In	Leak Check	.012@15"Hg	691.605					
1	5		0.34	1.16	694.9	98	95	184	2	61 | 240	249
1	10		0.33	1.09	698.2	99	94	183	2	53 | 230	250
2	15		0.41	1.36	701.4	100	96	183	2	56 | 225	250
2	20		0.41	1.36	705.2	101	96	183	2	56 | 222	252
3	25		0.56	1.86	709.1	100	95	183	3	52 | 220	251
3	30	952	0.57	1.89	713.194	101	95	184	3	50 | 219	251
					21.589						
				Port D	Leak Check		005@5"Hg				
	TOTAL θ		AVG. $\sqrt{\Delta p}$	AVG. ΔH	TOTAL V_m	AVG. T_m		AVG. T_s	MAX. VAC.	MAX. TEMP.	MIN. MAX.

COMMENTS:

WESTON

SHEET 2 OF 2

CLIENT RMA-SQT

PLANT SQT

LOCATION Stack

EPA METHOD 0050 FIELD DATA FORM

OPERATOR McCallum

RUN NO. Two DATE 6/11/93

K FACTOR 3.31 3.33 (.91 .96)

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE INLET (deg F)	DRY GAS METER TEMPERATURE OUTLET (deg F)	SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F)	FILTER BOX TEMP. (deg F)
	0	1209			713.475						
B 1	5		0.49	1.62	717.1	87	87	185	3	63/193	249
1	10		0.45	1.48	720.9	90	88	183	3	51/214	248
2	15		0.59	1.95	724.9	92	88	183	3	50/226	252
2	20		0.59	1.95	729.0	94	88	183	4	55/232	249
3	25		0.64	2.11	733.1	95	89	184	4	61/233	254
3	30	1239	0.67	2.21	737.473	96	90	181	5	64/244	255
					(23.998)	Leak	Check .008 @ 8" Hg		Final		
						Leak	Check .008 @ 15" Hg		Init		
A	0	1311			737.733						
1	5		0.36	1.19	740.7	87	88	183	3	68/213	252
1	10		0.38	1.25	744.0	90	87	183	4	48/224	252
2	15		0.41	1.35	747.3	92	88	183	4	57/230	252
2	20		0.45	1.48	750.8	92	88	182	5	59/230	248
3	25		0.52	1.77	754.3	91	87	183	7	63/221	249
3	30	1341	0.50	1.65	758.335	93	89	184	8	65/189	253
					(20.602)						
	TOTAL θ		AVG. $\sqrt{\Delta p}$	AVG. ΔH	TOTAL V_m	AVG. T_m		AVG. T_s	MAX. VAC.	MAX. TEMP.	MIN. 248
			.70516025	1.660	89.933	93.04166		183.208	8	68/244	MAX 260

$V_{m\,std}$ = 70.28

%M = 63.0

SCFM = 7880

ACFM = 31600

%I = 99.5

-.26

COMMENTS: Int leak port B .017 @ 15" Hg

g:\shared\airteam\forms\0050FDF2.DRW

EPA METHOD 0050 HYDROCHLORIC ACID SAMPLE RECOVERY AND INTEGRITY DATA FORM

Plant RMA - SQI Sample Date 6-11-93
Sample Location Stack Run Number RUN
Sample Recovery Person JPO Recovery Date 6-12-93
Filter # 1397

MOISTURE

Impingers

	0.1N H_2SO_4		0.1N NaOH		Silica Gel			
Final volume (wt)	2764	ml	209	ml	Final wt	320 g	____	g
Initial volume (wt)	250	ml	200	ml	Initial wt	300 g	____	g
Net volume (wt)	2514	ml	9	ml	Net wt	20 g	____	g

897
978
894
2764

Total moisture 2543
Color of silica gel NA
Description of impinger water Clear - all

Front half acetone
Filter container #

RECOVERED SAMPLE
RMA - TBURN - M0050 - AN2 - FRA ✓
RMA - TBURN - M0050 - RN2 - FILT ✓

Blank 0.1N H2SO4 container number ____ Sealed ____
Blank 0.1N NaOH container number ____ Sealed ____
Blank distilled water container number ____ Sealed ____

Description of particulate on filter ____

0.1N H_2SO_4 Impingers container number RMA-TBURN-M0050-RN2-H_2SO_4 Liquid level marked? ✓
0.1N NaOH Impingers container number RMA-TBURN-M0050-RN2-NAOH Liquid level marked? ✓
Samples stored and locked ____
Remarks: TSU 2,900 M/S

Date of laboratory custody ____
Laboratory personnel taking custody ____
Remarks: ____

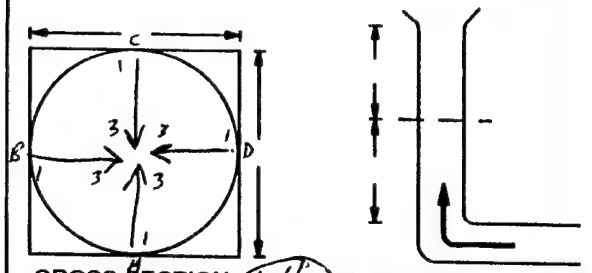
1000
1000

WESTON

SHEET 1 OF 3

EPA METHOD 0010 FIELD DATA FORM

CLIENT RMA
PLANT SQI
LOCATION Stack
OPERATOR Fritz
RUN NO. Two DATE 6/11/93
AMBIENT TEMP. (deg F) 70
BARO. PRESS. (in Hg) 24.57
METER BOX NO. 15
METER BOX ΔH@ 2.01
METER BOX CAL. (Y) .9954
PROBE LENGTH (ft) 30"
PROBE LINER MATERIAL Borosilicate
PROBE HEATER SETTING 25
K FACTOR 2.87, 2.92



LEAK CHECKS
PITOT TUBE: INITIAL Good FINAL Good
METHOD THREE: INITIAL Good FINAL Good

PITOT TUBE IDENTIFICATION NO. P64
PITOT TUBE CAL. FACTOR (C_p) .84
NOZZLE IDENTIFICATION NO. Glass 355
AVG. NOZZLE DIAMETER (D), in .355
PYROMETER IDENTIFICATION NO. 15
THERMOCOUPLE IDENTIFICATION NO. —
ASSUMED MOISTURE, % 63
ASSUMED TEMPERATURE, deg F 183
STATIC PRESSURE (P_{static}), in H_2O -.15
INITIAL LEAK RATE .010 @ 15 In Hg
MID-POINT LEAK RATE .011 @ 15 In Hg
FINAL LEAK RATE .008 @ 13 In Hg
XAD NO. see Rec sheet

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE INLET (deg F)	DRY GAS METER TEMPERATURE OUTLET (deg F)	SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F) Imp. Exit	IMPINGER EXIT GAS TEMP. (deg F) Probe Temp	FILTER BOX TEMP. (deg F)	XAD INLET TEMP. (deg F)	
0	0	0710			369.262									
1	5		.37	1.06	372.12	63	63	184	4.0	65	243	257	65	
1	10		.37	1.06	375.06	65	64	184	4.5	48	241	257	60	
1	15		.37	1.06	378.19	68	65	184	5.0	48	240	256	63	-.08
1	20		.39	1.12	381.24	69	65	185	5.0	50	240	257	66	
2	25		~~.55~~ WF .43	1.23	384.46	70	66	185	5.5	50	241	256	62	
2	30		.44	1.26	387.63	73	67	184	5.5	48	242	256	63	
2	35		.44	1.26	390.88	75	69	184	6.0	47	243	257	65	
2	40		.44	1.26	393.98	76	70	185	6.0	47	246	257	66	
3	45		.58	1.67	397.70	78	72	184	8.0	46	246	255	64	-.19
3	50		.56	1.61	401.39	81	74	184	8.5	49	243	257	65	
3	55		.54	1.55	405.06	82	75	183	8.5	49	239	256	64	
3	60	0810	.51	1.46	408.627	83	77	184	8.5	48	238	255	65	
					Leak Check .011 at 12" Hg									
	0	0841			408.975									
1	5		.40	1.15	411.95	76	76	184	7.5	67	249	258	66	
1	10		.37	1.06	415.18	81	78	184	7.5	48	235	246	64	
1	15		.37	WF ~~1.08~~ 1.08	418.19	82	79	185	7.5	45	239	231	63	
	TOTAL θ		AVG. $\sqrt{\Delta p}$	AVG. ΔH	TOTAL V_m	AVG. T_m		AVG. T_s	MAX. VAC.	MAX. TEMP.		MIN. MAX.	MAX. TEMP.	

COMMENTS:

WESTON

CLIENT RMA
PLANT SQI
LOCATION Stack

EPA METHOD 0010 FIELD DATA FORM

OPERATOR Fritz
RUN NO. Two
K FACTOR 2.92

SHEET 2 OF 3
DATE 6/11/93

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE		SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F)		FILTER BOX TEMP. (deg F)	XAD INLET TEMP. (deg F)	
						INLET (deg F)	OUTLET (deg F)			Imp Exit	Probe Temp			
1	20		.37	1.08	421.25	85	81	185	7.5	48	248	245	65	
2	25		.52	1.52	424.69	85	82	185	10.0	45	245	245	66	
2	30		.49	1.43	428.25	86	82	184	11.0	47	244	256	67	
2	35		.52	1.52	431.77	85	82	183	10.5	49	242	236	60	
2	40		.49	1.43	435.24	85	82	183	10.5	47	240	243	62	
3	45	*0926/0943	.58	1.69	439.978/439.275	86	83	185	13.0	49	241	253	62	
3	50		.59	1.72	443.01	85	84	186	6.0	53	244	255	55	
3	55		.60	1.75	446.85	83	82	182	6.0	43	241	259	58	-.14
3	60	0958	.51	1.66	450.630	87	84	184	6.0	44	238	259	58	
					Leak Check	.011 at 15" Hg								
	0	1026			450.913									
1	5		.47	1.37	454.16	79	79	182	5.0	59	255	250	58	
1	10		.49	1.43	457.64	80	79	184	5.0	51	241	254	58	-.10
1	15		.48	1.40	460.90	82	80	184	5.0	49	232	256	64	
1	20		.47	1.37	464.54	84	81	184	5.0	48	252	258	64	
2	25		.53	1.55	468.17	85	81	184	6.0	49	256	258	65	
2	30		.56	1.64	471.82	84	80	183	6.5	49	244	255	64	-.16
2	35		.58	1.69	475.63	84	81	184	7.0	51	238	254	62	
2	40		.55	1.61	479.39	87	84	184	7.0	53	240	257	64	
3	45		.60	1.75	483.21	88	84	184	7.5	57	242	257	66	
3	50	*1117	.62	1.81	487.18	86	82	182	8.0	58	242	256	67	
3	55		.63	1.84	491.12	86	83	184	8.5	58	238	253	65	
3	60	1127	.63	1.84	494.967	88	84	184	9.0	58	243	247	65	
					Leak check	.009 at 12" Hg								
	0	1158			495.262									
1	5		.45	1.31	498.59	84	82	182	6.5	65	232	254	66	
1	10		.42	1.23	501.92	86	84	182	6.5	46	236	255	56	
1	15		.43	1.26	505.25	84	83	183	6.5	49	235	252	57	
	TOTAL θ		AVG. $\sqrt{\Delta p}$	AVG. ΔH	TOTAL V_m	AVG. T_m		AVG. T_s	MAX. VAC.	MAX. TEMP.		MIN. MAX.	MAX. TEMP.	

COMMENTS: *0926 Stop test, filter change, Leak check .014 at 15" Hg Restart 0943, 439.275. *1117 power stopped back running at 1118

CLIENT RMA
PLANT SQI
LOCATION Stack

EPA METHOD 0010 FIELD DATA FORM

OPERATOR Fritz
RUN NO. TWO
K FACTOR 2.92

SHEET 3 OF 3
DATE 6/11/93

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE		SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F)		FILTER BOX TEMP. (deg F)	XAD INLET TEMP. (deg F)	
						INLET (deg F)	OUTLET (deg F)			Imp Exit	Probe Temp			
1	20		.42	1.23	508.51	85	83	184	6.5	52	246	258	60	-.13
2	25		.52	1.52	512.09	85	84	184	7.5	52	253	258	61	
2	30		.50	1.46	515.64	84	82	183	8.0	53	251	257	62	-.17
2	35		.50	1.46	519.16	85	~~86~~ 83	185	8.0	53	248	257	66	
2	40		.52	1.52	522.77	88	85	185	8.5	55	249	259	64	
3	45		.59	1.72	526.54	89	86	184	9.0	54	247	258	63	-.20
3	50		.58	1.69	530.34	88	84	182	9.5	55	248	254	64	
3	55		.57	1.66	534.12	86	83	183	10.0	55	243	255	63	
3	60	1258	.56	1.64	537.900	85	83	182	10.0	58	240	253	66	
					Leak Check	.008 @ 13" Hg								
	TOTAL θ 240		AVG. $\sqrt{\Delta p}$ .704538	AVG. ΔH 1.45188	TOTAL V_m 167.415	AVG. T_m 80.344		AVG. T_s 183.79	MAX. VAC.	MAX. TEMP.		MIN. MAX.	MAX. TEMP.	

COMMENTS:

g:\shared\airteam\forms\0010FDF2.DRW

EPA METHOD 0010
SAMPLE RECOVERY AND INTEGRITY DATA FORM

Plant RMA - JQI
Sample Location JOHN
Sample Recovery Person JDD
Sample Date 6-11-93
Run Number TWO
Recovery Date 6-11-93

MOISTURE

	Impingers	Condensor	Silica Gel
Final volume (wt)	4956 ml	ml	Final wt 351 g g
Initial volume (wt)	200 ml	XAD = 15 gm ml	Initial wt 300 g g
Net volume (wt)	4757 ml	ml	Net wt 51 g g

Total moisture 4757 + 15 + 51 = 4822
Color of silica gel 4772
Description of impinger water clear

902
868
520
937
907
822
4956

RECOVERED SAMPLE

Blank Filter container number _____ Sealed _____
Blank XAD container number _____ Sealed _____
Filter/~~XAD~~ container number RMA-JBORN-M0010-RN2-FILT Sealed ✓
~~Filter~~/XAD container number RMA-JBORN-M0010-RN2-XAD Sealed ✓
Filter/XAD container number _____ Sealed _____
Filter/XAD container number _____ Sealed _____
Description of particulate on filter _____
(6 of 6) Condenser water container number RMA-JBORN-M0010-RN2-COND Liquid level marked? ✓
Front-half solvent rinse container number RMA-JBORN-M0010-RN2-FHS Liquid level marked? ✓
Impinger contents and back-half water rinse container number RMA-JBORN-M0010-RN2-COND Liquid level marked? ✓
Back-half solvent rinse continer number RMA-JBORN-M0010-RN2-BHS Liquid level marked? ✓
Water blank container number _____ Liquid level marked? _____
Solvent blank container number _____ Liquid level marked? _____

Samples stored and locked ✓ OK JDD
Remarks: _____

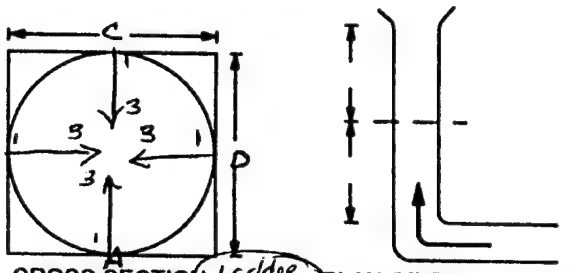
Date of laboratory custody _____
Laboratory personnel taking custody _____
Remarks: EPA 0010 blank train setup for test run 2 - recovered along with source samples.

WESTON

SHEET 1 OF 3

EPA METHOD 23 FIELD DATA FORM

CLIENT RMA - SQI
PLANT SQI
LOCATION STACK
OPERATOR DiCARLO
RUN NO. TWO DATE 6-11-93
AMBIENT TEMP. (deg F) 85
BARO. PRESS. (in Hg) 24.57
METER BOX NO. 12
METER BOX ΔH@ 2.012
METER BOX CAL. (Y) 1.010
PROBE LENGTH (ft) 30"
PROBE LINER MATERIAL Borosilicate
PROBE HEATER SETTING 250 ±25
K FACTOR 2.99



CROSS SECTION PLAN OR ELEVATION

LEAK CHECKS
PITOT TUBE: INITIAL Good FINAL Good
METHOD THREE: INITIAL Good FINAL Good

PITOT TUBE IDENTIFICATION NO. P52
PITOT TUBE CAL. FACTOR (C_p) .840
NOZZLE IDENTIFICATION NO. BORO 355
AVG. NOZZLE DIAMETER (D), in .355
PYROMETER IDENTIFICATION NO. 12
THERMOCOUPLE IDENTIFICATION NO. —
ASSUMED MOISTURE, % 62%
ASSUMED TEMPERATURE, deg F 181
STATIC PRESSURE (P_{static}), in H_2O -.13
INITIAL LEAK RATE .008 @ 15 in Hg
MID-POINT LEAK RATE .008 @ 8 in Hg
FINAL LEAK RATE .012 @ 16 in Hg
XAD NO. N/A Soc. Rec. Sheet

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE INLET (deg F)	DRY GAS METER TEMPERATURE OUTLET (deg F)	SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F)	IMPINGER EXIT GAS TEMP. (deg F) Probe	FILTER BOX TEMP. (deg F)	XAD INLET TEMP. (deg F)	
Port C 0	0	7:10			621.981									
1	5		.42	1.26	625.24	64	63	183	4.0	56	258	252	57	2.99
1	10		.42	1.26	628.55	67	64	183	4.0	49	246	253	66	3.02
1	15		.43	1.29	631.90	69	65	183	4.5	45	241	253	66	
1	20		.47	1.42	635.39	70	65	185	5.0	43	239	254	61	-.08
2	25		.50	1.51	639.15	73	67	184	5.5	42	239	254	66	
2	30		.48	1.45	642.78	76	69	186	5.5	45	241	256	66	
2	35		.49	1.48	646.34	77	70	183	5.5	44	241	254	64	
2	40		.50	1.51	650.0	78	71	183	5.5	45	242	258	66	
3	45		.67	2.02	654.01	80	73	184	7.0	46	239	252	66	-.20
3	50		.65	1.99	658.21	82	74	184	7.0	46	237	248	66	
3	55		.64	1.96	662.28	83	75	183	7.5	48	236	251	67	3.07
3	60	8:10	.59	1.81	666.336	82	75	183	7.5	47	237	251	67	
					Leak Check OK @ .012 @ 9" Hg									
Port B														
	0	8:41			666.720								42	3.07
1	5		.50	1.54	670.39	77	77	183	7.0	65	235	247	42	-.08
1	10		.50	1.54	674.135	80	77	183	7.0	46	225	247	59	
1	15		.49	1.50	677.85	82	78	183	7.0	46	238	248	61	
	TOTAL θ		AVG. $\sqrt{\Delta p}$	AVG. ΔH	TOTAL V_m	AVG. T_m		AVG. T_s	MAX. VAC.	MAX. TEMP.		MIN. MAX. TEMP.	MAX. TEMP.	

COMMENTS:

WESTON

CLIENT RMA-SQI
PLANT SQI
LOCATION STACK

EPA METHOD 23 FIELD DATA FORM

SHEET 2 OF 3
OPERATOR DiCARLO
RUN NO. TWO
K FACTOR 3.07 | 3.10
DATE 6-11-9

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE INLET (deg F)	DRY GAS METER TEMPERATURE OUTLET (deg F)	SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F)	IMPINGER EXIT GAS TEMP. Probe	FILTER BOX TEMP. (deg F)	XAD INLET TEMP. (deg F)
					677.85								
1	20		.50	1.54	681.44	81	78	183	8.0	46	240	248	62
2	25		.57	1.75	685.35	82	79	184	10.0	47	241	248	62
2	30		.57	1.75	689.17	84	80	184	10.0	48	244	250	67
2	35		.57	1.75	693.03	82	79	182	11.0	47	243	249	61
2	40		.57	1.75	696.81	81	79	183	12.0	46	242	249	62
3	45	*	.64	1.96 *	700.490	93	80	184	13.0	48	243	247	66
3	50		.65	1.99	705.275	81	81	184	5.5	60	268	246	53
3	55		.67	2.06	709.55	83	81	183	6.0	48	225	249	66
3	60	9:58	.62	1.90	713.749	85	81	183	6.0	49	225	246	65
				OK LEAK CHECK @ 8" Hg			.008						
PORT A													
	0	10:26			719.104								
1	5		.43	1.32	717.58	81	80	183	4.5	65	252	247	66
1	10		.44	1.35	721.09	82	80	183	4.5	49	230	245	60.57
1	15		.43	1.32	724.61	83	80	184	4.5	48	234	246	61
1	20		.40	1.23	728.01	86	82	184	4.0	51	240	248	64
2	25		.46	1.43	731.58	88	83	184	4.5	52	245	247	63
2	30		.49	1.52	735.29	86	81	184	5.0	49	241	247	61
2	35		.53	1.64	739.14	87	83	184	5.0	48	240	248	63
2	40		.49	1.52	742.90	87	83	183	5.0	50	238	247	64
3	45		.54	1.67	746.76	84	82	183	5.0	49	233	246	58
3	50		.54	1.67	750.60	85	82	183	5.0	49	239	246	55
3	55		.54	1.67	754.40	86	83	183	5.5	51	239	251	53
3	60	11:26	.54	1.67	758.246	84	83	184	6.0	53	239	247	52
				LEAK CHECK @ 8" Hg			.012						
PORT D													
	0	11:68			758.547								
1	5		.32	.99	761.59	85	84	184	4.0	65	225	251	48
1	10		.32	.99	764.65	86	84	184	4.5	51	269	251	48
1	15		.33	1.02	767.77	84	84	183	5.0	49	251	249	49
	TOTAL θ		AVG. $\sqrt{\Delta p}$	AVG. ΔH	TOTAL V_m	AVG. T_m		AVG. T_s	MAX. VAC.	MAX. TEMP.		MIN. MAX.	MAX. TEMP.

3.07 -.12
3.07 -.05
3.10

COMMENTS: * Stopat 9:28 @45 700.490 leak check OK @ 14" Hg @ .016 | Start @ 701.154 @ 9:43

WESTON

CLIENT BMA/SQI
PLANT SQI
LOCATION STACK

EPA METHOD 23 FIELD DATA FORM

SHEET 3 OF 3
OPERATOR DiCARLO
RUN NO. TWO
K FACTOR 3.10
DATE 6-11-92

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE		SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F)		FILTER BOX TEMP. (deg F)	XAD INLET TEMP. (deg F)
						INLET (deg F)	OUTLET (deg F)				Probe		
					767.77								
1	20		.33	1.02	770.89	83	83	183	5.0	52	247	249	49
2	25		.35	1.08	774.03	84	83	183	5.0	54	247	247	49
2	30		.41	1.27	777.31	85	84	184	6.5	55	248	247	49
2	35		.35	1.08	780.51	85	84	184	6.5	55	247	249	50
2	40		.40	1.24	783.82	86	84	184	6.5	54	251	248	51
3	45		.49	1.52	787.49	85	83	183	10.0	52	247	250	55
3	50		.46	1.43	790.03	85	84	183	11.5	53	249	248	58
3	55		.43	1.33	794.23	84	83	183	13.0	54	245	248	59
3	60	12.58	.41	1.27	796.789	85	84	183	14.0	57	246	247	59
	TOTAL θ 240		AVG. $\sqrt{\Delta p}$ .69696	AVG. ΔH 1.5056	TOTAL V_m 173.104	AVG. T_m 80.05		AVG. T_s 183.458	MAX. VAC. 14.0	MAX. 165	TEMP. 269	MIN. 245 MAX. 258	MAX. TEMP. 59

-.11

COMMENTS:

WESTON
MANAGERS DESIGNERS/CONSULTANTS

EPA METHOD 23 (PCDD/PCDF)
SAMPLE RECOVERY AND INTEGRITY DATA FORM

Plant RMA - JQF
Sample Location Stack
Sample Recovery Person JDD
Sample Date 6-11-93
Run Number TWO
Recovery Date 6-11-93

MOISTURE

	Impingers			Silica Gel	
Final volume (wt)	5053 ml	ml		Final wt 341 g	g
Initial volume (wt)	200 ml	XAD = 20gms ml		Initial wt 300 g	g
Net volume (wt)	4853 ml	ml		Net wt 41 g	g

Total moisture 4853 + 20 + 41 = 4914
Color of silica gel 10% blue
Description of impinger water all clear

66
486
887
898
945
371
5053

RECOVERED SAMPLE

Blank Filter container number _____ Sealed ____
Filter container number RMA-TBORN-M23-RN2-FILT Sealed ✓
Blank XAD container number _____ Sealed ____
XAD container number RMA-TBORN-M23-RN2-XAD Sealed ✓
Description of particulate on filter _____
Front-half acetone rinse container number RMA-TBORN-M23-RN2-FHS Liq. lev. marked? ✓
Front-half methylene chloride rinse container number " Liq. lev. marked? ____
Back-half water container number RMA-TBORN-M23-RN2-COND Liq. lev. marked? ✓
Back-half methylene chloride solution rinse RMA-TBORN-M23-RN2-BHS Liq. lev. marked? ✓
Toluene QA / QC rinse RMA-TBORN-RN2-M23-TOL Liq. lev. marked? ✓
Blank distilled water container number _____ Liq. lev. marked? ____
Blank acetone container number _____ Liq. lev. marked? ____
Blank methlylene choride container number _____ Liq. lev. marked? ____
Samples stored and locked ✓ JDD
Remarks: _____

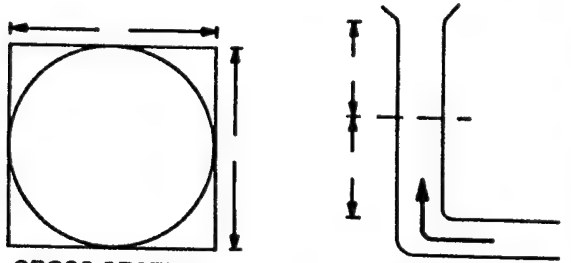
Date of laboratory custody _____
Laboratory personnel taking custody _____
Remarks: _____

WESTON

Cr +6 FIELD DATA FORM

SHEET 1 OF 2

CLIENT RMA
PLANT SQI
LOCATION STACK
OPERATOR KK
RUN NO. TWO DATE 6/11/93
AMBIENT TEMP. (deg F) 85
BARO. PRESS. (in Hg) 24.57
METER BOX NO. NUTECH 9
METER BOX ΔH@ 1.902
METER BOX CAL. (Y) 1.001
PROBE LENGTH (ft) 3
PROBE LINER MATERIAL TEFLON
PROBE HEATER SETTING N/A
K FACTOR 2.77 87°TM 163°TB



LEAK CHECKS
PITOT TUBE: INITIAL ✓ FINAL ✓
METHOD THREE: INITIAL N/A FINAL N/A

PITOT TUBE IDENTIFICATION NO. P53
PITOT TUBE CAL. FACTOR (C_p) .84
NOZZLE IDENTIFICATION NO. CRFC 355A
AVG. NOZZLE DIAMETER (D), in. .354
PYROMETER IDENTIFICATION NO. NUTECH 9
THERMOCOUPLE IDENTIFICATION NO.
ASSUMED MOISTURE, % 63
ASSUMED TEMPERATURE, deg F 103
STATIC PRESSURE (P_{static}), in H_2O -.20
INITIAL LEAK RATE .009 @ 15 in Hg
MID-POINT LEAK RATE — @ — in Hg
FINAL LEAK RATE .004 @ 12 in Hg

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE INLET (deg F)	DRY GAS METER TEMPERATURE OUTLET (deg F)	SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F)	KOH RECIR. RATE (ml/min)
C	0	1034			563.753						
1	5		.56	1.55	566.8	81	81	182	5.0	67	50
1	10		.54	1.49	570.4	86	82	183	9.0	56	
2	15		.50	1.39	574.0	89	83	184	10.0	59	
2	20		.49	1.36	577.3	89	83	183	9.5	61	
3	25		.46	1.27	580.9	89	83	183	9.5	65	
3	30	1104	.46	1.27	584.209	90	84	182	9.0	66	—
				LC	good @	10"	Hg				
D	0	1111			584.392						
1	5		.49	1.36	587.7	85	84	182	8.0	66	50
1	10		.49	1.36	591.0	87	85	183	8.0	63	
2	15		.43	1.19	594.3	87	84	183	8.0	63	
2	20		.43	1.19	597.5	87	84	183	8.0	60	
3	25		.35	.97	600.5	88	85	183	7.0	61	
3	30	1141	.38	1.05	603.715	88	85	184	7.0	64	—
				✱ LC	Good	@	18"	Hg			
	TOTAL θ		AVG. $\sqrt{\Delta p}$	AVG. ΔH	TOTAL V_m	AVG. T_m		AVG. T_s	MAX. VAC.	MAX. TEMP.	

COMMENTS: ✱ LC WAS Good coming out of port D however, AFTER move TO PORT A, FITTINGS WERE Tightened TO PASS leak check.

WESTON

Cr +6 FIELD DATA FORM

SHEET 2 OF 2

CLIENT RMA - SQI
PLANT SQI
LOCATION STACK

OPERATOR KH
RUN NO. TWO DATE 6/11/93
K FACTOR

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE INLET (deg F)	DRY GAS METER TEMPERATURE OUTLET (deg F)	SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F)	KOH RECIR. RATE (ml/min)
A	0	1209			605,116						
1	5		.56	1.55	608.4	84	84	181	6.0	66	50
1	10		.56	1.55	612.1	86	84	182	7.0	59	|
2	15		.48	1.33	615.3	89	85	182	9.0	60	|
2	20		.46	1.27	618.7	89	84	182	9.0	63	|
3	25		.41	1.14	621.9	89	85	183	9.0	66	|
3	30	1239	.42	1.16	625,002	90	85	182	9.0	67	|
			** LC good @ 10" Hg								
B	0	1311			627,619						
1	5		.60	1.66	631.0	87	86	182	7.0	66	50
1	10		.60	1.66	634.5	90	86	182	9.0	57	|
2	15		.48	1.33	637.9	91	85	181	9.0	54	|
2	20		.45	1.25	641.3	93	86	182	9.0	56	|
3	25		.45	1.25	644.8	92	86	182	9.0	58	|
3	30	1341	.41	1.14	647,847	92	86	182	9.5	62	|
					20.823						
					19.886						
					20.856			63.1 Q_2 M			
					~~20.856~~			ACFM = 30900			
					19.323			SCFM = 7700			
								$V_{m(std)}$ = 64.45			
											11:30
	TOTAL θ 120		AVG. $\sqrt{\Delta p}$ .68943	AVG. ΔH 1.3225	TOTAL V_m 80,888	AVG. T_m 86.3		AVG. T_s 182.4	MAX. VAC.	MAX. TEMP.	

COMMENTS: FINAL PH = 9.0
** LC Good coming out of port A. However, after move

EPA Cr^{+6} Method
SAMPLE RECOVERY AND INTEGRITY DATA FORM

Plant RMA - SQI Sample Date 6/11/93
Sample Location STACK Run Number TWO
Sample Recovery Person KW Recovery Date 6/11/93

MOISTURE

Impingers	KOH	Silica Gel
Final volume (wt)	950 + 950 ml + 905	Final wt 367 g ____ g
Initial volume (wt)	300 + 150 ml + 75	Initial wt 300 g ____ g
Net volume (wt)	2280 ml //	Net wt 67 g ____ g
Total moisture	2347 //	

Color of silica gel PINK / BLUE

RECOVERED SAMPLE

Description of particulate LIGHT TO MODERATELY HEAVY
KOH impingers and rinse container number(s) RMA - TBURN - CR6 - RN2 - KOH (4 OF 4)
Sample Filtered? ✓ Liquid level marked? ✓
Blank KOH container number(s) RMA - TBURN - CR6 - SB - KOH Liquid level marked? ✓

Samples stored and locked ✓
Remarks: FINAL PH = 9.0

Date of laboratory custody ____
Laboratory personnel taking custody ____
Remarks: ____

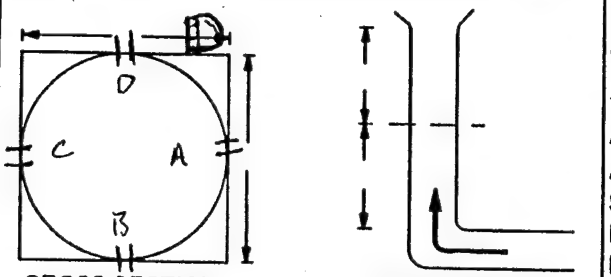
Start ... 10:05
Meter Temp - 62.5
Meter Temp - 75
Start --. 14

WESTON

SHEET 1 OF 2

MULTI METALS FIELD DATA FORM

CLIENT RMA - SQT
PLANT SQT
LOCATION South
OPERATOR BARBER
RUN NO. TWO DATE 6-11-93
AMBIENT TEMP. (deg F) 67°
BARO. PRESS. (in Hg) 24.57
METER BOX NO. 9
METER BOX ΔH@ 1.902
METER BOX CAL. (Y) 1.001
PROBE LENGTH (ft) 30"
PROBE LINER MATERIAL BORO
PROBE HEATER SETTING 22
K FACTOR 3.46 (75°) 3.53 (85°)



CROSS SECTION

PLAN OR ELEVATION

PITOT TUBE IDENTIFICATION NO. P-70
PITOT TUBE CAL. FACTOR (C_p) .840
NOZZLE IDENTIFICATION NO. BORO .375
AVG. NOZZLE DIAMETER (D), in .375
PYROMETER IDENTIFICATION NO. #9
THERMOCOUPLE IDENTIFICATION NO. #1
ASSUMED MOISTURE, % 62
ASSUMED TEMPERATURE, deg F 181
STATIC PRESSURE (P_{static}), in H_2O — .15
INITIAL LEAK RATE .015 @ 15 In Hg
MID-POINT LEAK RATE — @ — In Hg
FINAL LEAK RATE .005 @ 9 In Hg
FILTER NO. N/A

LEAK CHECKS
PITOT TUBE: INITIAL ok FINAL ok
METHOD THREE: INITIAL — FINAL —

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE INLET (deg F)	DRY GAS METER TEMPERATURE OUTLET (deg F)	SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F)	FILTER BOX TEMP. (deg F)	
	0				470.720							START
B 1	5	0710	.37	1.28	473.9	67	66	185	3	65	242	
1	10		.38	1.31	477.4	73	68	185	4	57	241	
2	15		.50	1.73	481.2	75	68	185	4	53	244	-.19
2	20		.55	1.90	485.2	79	69	186	4	49	244	
3	25		.60	2.08	489.5	82	71	186	5	50	245	
3	30	0740	.60	2.08	493.765	85	72	185	5	51	244	
					LC-.008@6H							
	0	0757	—	—	494.000	—	—	—	—	—	—	
A 1	5		.45	1.56	497.7	79	74	182	4	61	242	
1	10		.45	1.56	501.4	83	75	183	4	54	244	
2	15		.47	1.63	505.1	86	78	183	4	57	244	-.12
2	20		.48	1.69	508.9	88	79	184	5	57	244	
3	25		.56	1.98	512.8	89	80	183	5	61	246	
3	30	0827	.53	1.87	516.852	90	80	183	5	64	245	
					LC .012@7"Hg							
	TOTAL θ		AVG. $\sqrt{\Delta p}$	AVG. ΔH	TOTAL V_m	AVG. T_m		AVG. T_s	MAX. VAC.	MAX. TEMP.	MIN. MAX.	

COMMENT

WESTON

CLIENT RMA SQF
PLANT SQF
LOCATION Stack

MULTI METALS FIELD DATA FORM

OPERATOR BARDER
RUN NO. TWO
K FACTOR 3.53 @ 85°

DATE 6-11-93

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE INLET (deg F)	DRY GAS METER TEMPERATURE OUTLET (deg F)	SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F)	FILTER BOX TEMP. (deg F)
	0	0844			517.100						
D 1	5		.37	1.31	520.3	83	81	185	4	67	241
1	10		.35	1.24	523.7	85	82	183	4	60	245
2	15		.40	1.41	527.2	88	83	183	4	55	245
2	20		.44	1.55	530.8	87	82	183	5	51	244
3	25		.50	1.77	534.8	88	83	184	5	52	245
3	30	0914	.49	1.73	538.686	91	84	183	5	53	245
					LC-.003@6"Hg						
	0		—	—	538.810	—	—	—	—	—	—
C 1	5	0923	.46	1.62	542.8	86	84	184	5	67	244
1	10		.42	1.48	546.3	90	85	183	5	55	244
2	15		.55	1.94	550.4	90	85	182	6	52	247
2	20		.54	1.91	554.3	89	85	182	6	51	244
3	25		.58	2.05	558.5	90	85	183	7	54	244
3	30	0953	.62	2.19	562.965	91	85	184	7	59	246
					LC-.008@9"Hg						
					24.155						
		62.7% m			21.586						
		7800 CCFM			23.045						
		31100 ACFM			22.852						
		98.6 °F									
		73.81 Vm std.									
											300
					91.638						
	TOTAL θ		AVG. $\sqrt{\Delta p}$	AVG. ΔH	TOTAL V_m	AVG. T_m		AVG. T_s	MAX. VAC.	MAX. TEMP.	MIN. MAX.
	120		0.694730	1.70292	91.638	81.625		183.625			

-.12

COMMEN

EPA MULTI-METALS
SAMPLE RECOVERY AND INTEGRITY DATA FORM

Plant RMA - JQI
Sample Location JQI
Sample Recovery Person JRD
Filter Number(s) W/A

Sample Date 6-11-93
Run Number RN2
Recovery Date 6-11-93

MOISTURE

Impingers	HNO_3/H_2O_2	Dry Imp. 3/4	$KMNO_4$	Silica Gel
Final vol (wt)	2503 ml	290 ml	222 ml	Final wt 321 g
Initial vol (wt)	200 ml	0 ml	200 ml	Initial wt 300 g
Net volume (wt)	2303 ml	290 ml	22 ml	Net wt 21 g

867
888
748
2503

Total moisture 2615 + 21 = 2636
Color of silica gel blue 70%
Description of particulate slight yellow tint on filter
Description of impinger water (condensate/HNO_3) all clear

RECOVERED SAMPLE

Container #

(1) Filter container number _____ Sealed _____
(2) Front-half acetone container number(s) NNR Liquid level marked? _____
(3) Front-half 0.1N nitric container number (s) RMA-TBURN-MMTL Liquid level marked? ✓
(4) Back-half condensate impingers (1 through 3) and nitric rinse container number(s) RMA-TBURN-MMTL-RN2-BHN Liquid level marked? ✓ (3 of 3) RN2-FHN
(5A) Impinger 4 condensate and nitric rinse container number(s) RMA-TBURN-MMTL-RN2-Imp4 Liquid level marked? ✓
(5B) $KMnO_4$ impingers 5 and 6 and $KMnO_4$ and water rinse container number(s) RMA-TBURN-MMTL-RN2-RMn04 Liquid level marked? ✓
(5C) 8NHCl rinse (if required) container number RMA-TBURN-MMTL Liquid level marked? ✓
(7) Blank acetone container number RN2-HCl/H2O Liquid level marked? _____
(8) Blank 0.1N nitric container number _____ Liquid level marked? _____
(9) Blank nitric/H_2O_2 container number _____ Liquid level marked? _____
(10) Blank $KMNO_4$ container number _____ Liquid level marked? _____
(11) Blank 8N HCl container number _____ Liquid level marked? _____
(12) Blank Filter container number _____ Liquid level marked? _____

Samples stored and locked Ok JRD
Date of laboratory custody _____
Laboratory personnel taking custody _____
Remarks: M0010 blank train setup for RMA 200 recovered along with JQO

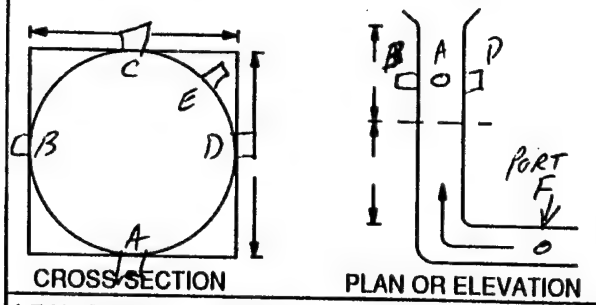
NOTE: Container (6) is the silica gel.

WESTON

SHEET 1 OF 2

VOST FIELD DATA FORM

CLIENT RMA-SQI
PLANT Denver Colorado
LOCATION Stack Breeching
OPERATOR Jack Mills
RUN NO. TWO DATE 6/11/93
AMBIENT TEMP. (deg F) 80
BARO. PRESS. (in Hg) 24.57
METER BOX NO. VOST 4
METER BOX ΔH@ N/A
METER BOX CAL. (Y) .9963
PROBE LENGTH (ft) 3 FT
PROBE LINER MATERIAL Borosilicate
PROBE HEATER SETTING > 150 °C
K FACTOR



TENAX TUBE SAMPLE NUMBERS
SET ONE RMA-TBURN-M0030-RN2-TP1 (13930)
SET TWO RMA-TBURN-M0030-RN2-TP2 (13941)
SET THREE RMA-TBURN-M0030-RN2-TP3 (13928)
SET FOUR RMA-TBURN-M0030-RN2-TP4 (13945)
SET FIVE RMA-TBURN-M0030-RN2-TP5 (13918)
SET SIX RMA-TBURN-M0030-RN2-TP6 (13926)
STACK BLANK
RMA-TBURN-M0030-RN2-(CONT) 1-4

LEAK CHECKS	SET ONE:	SET TWO:	SET THREE:	SET FOUR:	SET FIVE:	SET SIX:
INITIAL:	Good	Good	Good	Good	Good	Good
FINAL:	Good	Good	Good	Good	Good	Good

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	ROTO-METER SETTING	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (liter)	DRY GAS METER TEMPERATURE INLET (deg C)	DRY GAS METER TEMPERATURE OUTLET (deg C)	PROBE TEMP. (deg C)	PUMP VACUUM (in. Hg gauge)	FIRST CONDENS. EXIT GAS TEMP. (deg C)	SECOND CONDENS. EXIT GAS TEMP. (deg C)
Port F	0	0738			123.552						
	5		78	1.5	129.0	N/A	31	191	7	15	14
	10		80	1.5	134.7		31	192	11	10	12
	15		80	1.5	140.2		31	192	12	10	12
	20	0758	77	1.5	145.748		31	193	12	10	13
				(1.50)	(22.196)		(31.00)				
	0	0810	—	—	146.772	—	—	—	—	—	—
	5		78	1.4	152.2	N/A	32	182	2.5	13	13
	10		78	1.5	157.7		32	182	3.5	10	13
	15		78	1.4	163.1		33	182	3.5	10	13
	20	0830	78	1.5	168.440		33	208	3.5	11	14
				(1.45)	(21.668)		(32.50)				
	0	0848	—	—	169.150	—	—	—	—	—	—
	5		78	1.5	174.6	N/A	33	179	5.0	12	12
	10		80	1.5	180.0		34	176	6.0	11	13
	15		78	1.5	186.2		34	184	6.0	11	13
	20	0908	78	1.5	191.125		34	207	6.0	11	13
	TOTAL θ			AVG. ΔH (1.50)	TOTAL V_m (21.975)		AVG. T_m (33.75)	AVG. T_s	MAX. VAC.	MAX. TEMP.	MAX. TEMP.

COMMENTS: Probe was leak checked before + after test run

CLIENT RMA - SQF
PLANT Denver Colorado
LOCATION South Breech Pads

VOST FIELD DATA FORM

OPERATOR Jack Mills SHEET 2 OF 2
RUN NO. TWO DATE 6/11/93
K FACTOR

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	ROTO-METER SETTING	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (liters)	DRY GAS METER TEMPERATURE		PROBE TEMP. (deg C)	PUMP VACUUM (in. Hg gauge)	FIRST CONDENS. EXIT GAS TEMP. (deg C)	SECOND CONDENS. EXIT GAS TEMP. (deg C)
						INLET (deg C)	OUTLET (deg C)				
	0	0920			192.075						
	5		80	1.5	197.4	N/A	35	184	6.0	14	14
	10		78	1.4	203.0		35	192	8.0	9	11
	15		80	1.5	208.6		35	194	9.0	10	12
	20	0940	80	1.5	214.122		35	192	9.0	10	12
				(1.475)	(22.047)		(35.00)				
	0	0954	—	—	215.120	—	—	—	—	—	—
	5		80	1.5	220.6	N/A	35	192	6.5	10	13
	10		~~78~~ 75	1.4	226.1		35	195	9.0	10	10
	15		75	1.4	231.3		36	196	9.0	10	11
	20	1014	75	1.4	236.685		36	196	9.0	10	11
				(1.425)	(21.565)		(35.50)				
	0	1027	—	—	237.372	N/A	—	—	—	—	—
	5		80	1.5	243.0		36	192	3.0	13	13
	10		80	1.5	246.4		36	194	3.0	10	11
	15		78	1.4	253.8		36	191	3.0	10	12
	20	1047	78	1.5	259.318		37	193	3.0	11	12
				(1.475)	(21.946)		(36.25)				
	TOTAL θ			AVG. ΔH	TOTAL V_m	AVG. T_m		AVG. T_s	MAX. VAC.	MAX. TEMP.	MAX. TEMP.

COMMENTS: Note ice bath maintained @ 32°F

g:\shared\airteam\forms\VOSTFD2.DRW

WESTERN.

GAS ANALYSIS DATA FORM

Plant: RMA Sample Location: Stack

Date: 6-11-93 Run No. — Operator: ARB

Sample Type: Single-point or multi-point; grab or integrated

Analytical Method: ORSAT Orsat Leak Check: OK

Run Number	Sample Location/Train ID	% CO_2	% O_2		% N_2
		Reading 1	Reading 2	Net[a]	100-Reading 2
~~TWO A ONE~~ (PHH)	Stack/D/F	9.6	13.8	4.2	
~~TWO A ONE~~ (PHH)	Stack/D/F	9.6	13.6	4.0	
~~TWOA ONE~~ (PHH)	Stack/D/F	9.5	13.5	4.0	
Two B	D/F & SU	10.0	13.2	3.2	
"	"	10.0	13.3	3.3	
"	"	(PHH) ~~10~~ 9.8	13.2	3.4	
Total	D/F Average	9.75		3.68	
TWO	Part/HCl	10.0	13.4	3.4	
		10.0	13.4	3.4	
		9.8	13.4	3.6	
	Avg	9.93		3.47	
Averages			---		

% N_2 = 100 - (% CO_2 + % O_2 + % CO) =

MW_d = 0.440 (% CO_2) + 0.320 (% O_2) + 0.280 (% N_2 + % CO) =

[a] Net % O_2 = Reading 2 - Reading 1

Integrated Bag Limits

CO_2 > 4% - 0.3% by vol

≤ 4% - 0.2% by vol

O_2 ≥ 15% - 0.2% by vol

< 15% - 0.3% by vol

analysis.gas

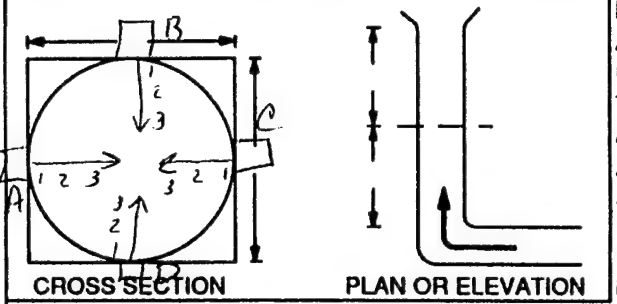
3.27
85

WESTON

SHEET 1 OF 2

EPA METHOD 0050 FIELD DATA FORM

CLIENT RMA-SQI
PLANT SQI
LOCATION STACK
OPERATOR McGlinn
RUN NO. three DATE 6/12/93
AMBIENT TEMP. (deg F) 68°
BARO. PRESS. (in Hg) 24.62
METER BOX NO. Metric #16
METER BOX ΔH@ 1.842
METER BOX CAL. (Y) .9923
PROBE LENGTH (ft) 30"
PROBE LINER MATERIAL Boro
PROBE HEATER SETTING 25
K FACTOR 3.12 3.15 3.18 3.21 3.24 3.30
60° 65 70 75 80 90



LEAK CHECKS
PITOT TUBE: INITIAL good FINAL good
METHOD THREE: INITIAL good FINAL good

PITOT TUBE IDENTIFICATION NO. P106
PITOT TUBE CAL. FACTOR (C_p) .840
NOZZLE IDENTIFICATION NO. .363
AVG. NOZZLE DIAMETER (D), in. .363
PYROMETER IDENTIFICATION NO. N/A #16
THERMOCOUPLE IDENTIFICATION NO. N/A #1
ASSUMED MOISTURE, % 62
ASSUMED TEMPERATURE, deg F 183
STATIC PRESSURE (P_{static}), in H_2O -1.7
INITIAL LEAK RATE .010 @ 15" in Hg
MID-POINT LEAK RATE .005 @ 7 in Hg
FINAL LEAK RATE .004 @ 9 in Hg
FILTER NO. 1399

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE INLET (deg F)	DRY GAS METER TEMPERATURE OUTLET (deg F)	SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F)	FILTER BOX TEMP. (deg F)
	0	7:56			758.836						
A 1	5		0.42	1.33	762.2	73	71	183	2	61/209	250
1	10		0.41	1.30	765.6	77	72	183	2	57/198	250
2	15		0.49	1.55	769.3	79	74	183	2	53/199	250
2	20		0.49	1.55	773.0	80	75	182	2	52/200	250
3	25		0.53	1.70	776.8	83	77	182	2	53/202	251
3	30	8:26	0.57	1.81	780.894	84	78	183	2	52/201	252
	A Final	LC .003@7"Hg									
	Init 3	LC .008@15"Hg									
B	0	8:40	—	—	781.139	—	—	—	—	—	—
1	5		0.45	1.45	784.6	85	83	183	2	57/221	250
1	10		0.47	1.49	788.2	85	82	183	2	50/206	249
2	15		0.59	1.91	792.2	87	83	184	3	50/205	250
2	20		0.55	1.78	796.1	85	84	183	3	54/209	250
3	25		0.54	1.97	800.2	90	85	183	3	58/215	250
3	30	9:10	0.60	1.96	804.236	89	85	183	3	54/211	249
	B Final	LC .005@7"Hg									
	TOTAL θ		AVG. $\sqrt{\Delta p}$	AVG. ΔH	TOTAL V_m	AVG. T_m		AVG. T_s	MAX. VAC.	MAX. TEMP.	MIN. MAX.

COMMENTS:

CLIENT RMA- SQI
PLANT SQI
LOCATION Stack

EPA METHOD 0050 FIELD DATA FORM

SHEET 2 OF 2

OPERATOR McMillan
RUN NO. three DATE 6/12/93
K FACTOR 3.27 3.30 3.24

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE INLET (deg F)	DRY GAS METER TEMPERATURE OUTLET (deg F)	SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F)	FILTER BOX TEMP. (deg F)
	0	9:26			804.463						
C 1	5		.39	1.27	807.7	87	86	183	3	68/266	250
1	10		0.37	1.20	810.9	89	86	183	3	51/241	250
2	15		0.50	1.63	814.7	90	87	184	3	54/235	251
2	20		0.57	1.71	818.5	93	89	184	3	58/233	252
3	25		0.50	1.65	822.4	94	90	183	4	60/236	252
3	30	9:56	0.49	1.61	826.215	95	90	183	4	58/237	250
		Port C Int	LC .008 @ 15" Hg	Final LC	.005 @ 7" Hg						
		Port D Int	LC .008 @ 15" Hg	Final LC	.004 @ 9" Hg						
D	0	10:17	—	—	826.447	—	—	—	—	—	—
1	5		0.30	.99	829.3	92	91	183	2	68/235	249
1	10		0.32	1.05	832.3	94	92	183	2	58/195	248
2	15		0.42	1.38	835.5	92	91	183	3	58/208	250
2	20		0.47	1.55	839.1	92	90	182	4	58/204	251
3	25		0.49	1.61	842.8	93	90	183	5	60/222	252
3	30	10:47	0.59	1.94	846.749	91	88	183	7	60/218	250
	TOTAL θ		AVG. $\sqrt{\Delta p}$ 0.6928203	AVG. ΔH 1.557916	TOTAL V_m 87.209	AVG. T_m 85.875		AVG. T_s 183	MAX. VAC. 7	MAX. TEMP. 68/266	MIN. 248 MAX. 252

9m: 627
Avm = 3000.
scfm ~ 7800.
%I ~ 98.8
Vmstd: 84.192

549.9

-.13

COMMENTS:

EPA METHOD 0050 HYDROCHLORIC ACID
SAMPLE RECOVERY AND INTEGRITY DATA FORM

Plant RMA - JOF Sample Date 6-12-93
Sample Location South Run Number Three
Sample Recovery Person JDV Recovery Date 6-12-93
Filter # 1399

MOISTURE

960
956 Impingers
781

	0.1N H_2SO_4		0.1N NaOH		Silica Gel			
Final volume (wt)	2697	ml	207	ml	Final wt	319 g		g
Initial volume (wt)	250	ml	200	ml	Initial wt	300 g		g
2681 Net volume (wt)	2447	ml	7	ml	Net wt	19 g		g

2697 Total moisture 2454 + 19 = 2473.
Color of silica gel blue 80%
Description of impinger water all clear

RECOVERED SAMPLE

Blank 0.1N H2SO4 container number _____ Sealed _____
Blank 0.1N NaOH container number _____ Sealed _____
Blank distilled water container number _____ Sealed _____

Description of particulate on filter _____
Front half acetone RMA-TOURN-M0050-RN3-FHA ✓
Filter RMA-TOURN-M0050-RN3-FILT ✓
0.1N H_2SO_4 Impingers container number RMA-TOURN-M0050-RN3-H2SO4 Liquid level marked? ✓
0.1N NaOH Impingers container number RMA-TOURN-M0050-RN3-NaOH Liquid level marked? ✓
Samples stored and locked OK JDV
Remarks: TSV = 2900

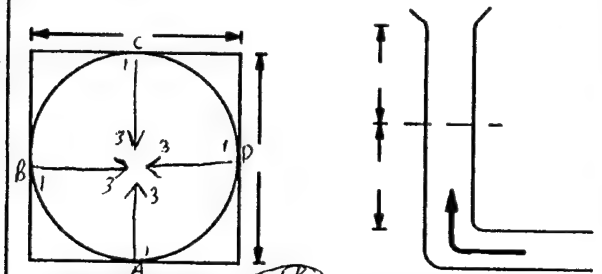
Date of laboratory custody _____
Laboratory personnel taking custody _____
Remarks: _____

WESTON DESIGN CONSULTANTS

SHEET 1 OF 3

CLIENT RMA
PLANT SOF
LOCATION Shash
OPERATOR Fritz
RUN NO. Mon DATE 6-12-93
AMBIENT TEMP. (deg F) 70
BARO. PRESS. (in Hg) 24.62
METER BOX NO. 15
METER BOX ΔH@ 2.010
METER BOX CAL. (Y) .9954
PROBE LENGTH (ft) 30"
PROBE LINER MATERIAL PYREX
PROBE HEATER SETTING 25
K FACTOR 3.00

EPA METHOD 0010 FIELD DATA FORM



CROSS SECTION (Ladder) PLAN OR ELEVATION

LEAK CHECKS
PITOT TUBE: INITIAL Good FINAL Good
METHOD THREE: INITIAL Good FINAL -

PITOT TUBE IDENTIFICATION NO. PBS
PITOT TUBE CAL. FACTOR (C_p) .843
NOZZLE IDENTIFICATION NO. 6 - 355
AVG. NOZZLE DIAMETER (D), in .355
PYROMETER IDENTIFICATION NO. #15
THERMOCOUPLE IDENTIFICATION NO. #1
ASSUMED MOISTURE, % 62
ASSUMED TEMPERATURE, deg F 182
STATIC PRESSURE (P_{static}), in H_2O
INITIAL LEAK RATE .015 @ 15 in Hg
MID-POINT LEAK RATE @ in Hg
FINAL LEAK RATE .008 @ 12 in Hg
XAD NO. See Rec. Sheet

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE INLET (deg F)	DRY GAS METER TEMPERATURE OUTLET (deg F)	SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	~~IMPINGER EXIT GAS~~ TEMP. (deg F) Filter Box	~~FILTER BOX~~ TEMP. (deg F) Imp Exit	~~FILTER BOX~~ TEMP. (deg F) Probe Temp	XAD INLET TEMP. (deg F)	
	0	0756			539.854									
1	5		.35	1.05	542.78	67	66	183	3.5	258	67	240	66	
1	10		.35	1.05	545.83	68	66	184	4.0	258	50	241	64	
1	15		.35	1.05	548.87	69	67	183	4.0	258	51	235	64	
1	20		.33	.99	551.79	70	67	183	4.0	259	51	241	62	
2	25		.40	1.20	554.94	71	68	184	5.0	258	51	244	64	
2	30		.40	1.20	558.12	71	69	183	5.0	258	53	241	63	-.10
2	35		.43	1.29	561.42	72	69	184	5.5	259	52	242	65	
2	40		.41	1.23	564.71	72	69	183	5.5	258	51	240	63	
3	45		.49	1.47	568.20	73	70	183	6.5	258	51	237	65	
3	50		.47	1.41	571.63	74	71	183	7.0	259	53	237	67	
3	55		.47	1.41	575.04	75	72	183	7.0	259	51	235	66	-.20
3	60	0856	.49	1.47	578.521	76	73	184	8.0	258	48	234	64	
					Leak Check	.004 @ 11" Hg								
	0				578.793									
1	5		.39	1.17	581.95	76	75	183	7.0	255	66	250	66	
1	10		.40	1.20	585.04	78	76	183	7.0	258	50	234	62	
1	15		.41	1.23	588.25	79	76	185	7.0	260	50	235	65	-.10
	TOTAL θ		AVG. $\sqrt{\Delta p}$	AVG. ΔH	TOTAL V_m	AVG. T_m		AVG. T_s	MAX. VAC.	MAX. TEMP.	MIN. MAX.		MAX. TEMP.	

COMMENTS:

WESTON

CLIENT KMA
PLANT 207
LOCATION Tracy

EPA METHOD 0010 FIELD DATA FORM

OPERATOR Fritz
RUN NO. Three
K FACTOR 3.00

SHEET 2 (WF) OF 3
DATE 6-12-93

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE INLET (deg F)	DRY GAS METER TEMPERATURE OUTLET (deg F)	SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F) Imp Exit	IMPINGER EXIT GAS TEMP. (deg F) Probe Temp	FILTER BOX TEMP. (deg F)	XAD INLET TEMP. (deg F)	
	15													
1	20		.41	1.23	591.47	80	77	184	7.5	52	241	259	66	-.12
2	25		.48	1.44	594.88	81	79	183	9.0	53	243	259	64	
2	30		.49	1.47	598.36	81	79	183	9.0	51	243	258	65	
2	35	*1001/1050	.49	1.47	601.875/~~602.165~~	82	79	184	9.5	52	245	259	67	
3	40		.52	1.56	605.85	81	80	184	4.0	66	242	259	63	
3	45		.55	1.65	609.60	83	81	183	5.0	49	245	256	67	-.24
3	50		.54	1.62	613.30	84	81	183	5.0	48	244	258	66	
3	55		.57	1.71	617.14	85	82	184	5.5	50	245	258	66	
3	60	1115	.55	1.65	620.917	85	82	184	5.5	53	248	258	67	
					Leak Check	.004 @ 12"Hg								
	0	1200			621.237									
1	5		.45	1.35	624.69	84	82	183	5.0	64	237	257	59	
1	10		.48	1.44	628.15	86	83	184	5.0	50	230	258	63	
1	15		.45	1.35	631.65	85	83	184	5.0	49	241	254	62	
1	20		.46	1.38	635.08	86	83	183	5.0	52	242	253	64	
2	25		.53	1.59	638.92	86	84	183	6.0	55	240	255	66	
2	30		.54	1.62	642.50	87	84	183	6.0	55	235	256	64	-.21
2	35		.53	1.59	646.19	86	84	184	6.0	57	235	258	63	
2	40		.51	1.53	649.88	87	84	183	6.5	57	241	258	65	
3	45		.49	1.47	653.60	86	84	184	6.0	58	247	257	66	
3	50		.49	1.47	657.20	87	85	183	6.0	58	250	257	67	-.15
3	55		.59	1.77	660.88	87	85	184	7.5	54	244	256	66	
3	60	1300	.59	1.77	664.814	88	85	183	8.0	53	242	257	67	
	0	1315			665.094									
1	5		.42	1.26	668.35	87	85	184	6.0	66	256	259	66	
1	10		.40	1.20	671.66	89	86	183	6.0	51	239	258	63	
1	15		.42	1.26	675.10	88	85	181	6.0	49	234	253	65	
	TOTALθ		AVG. $\sqrt{\Delta p}$	AVG. ΔH	TOTAL V_m	AVG. T_m		AVG. T_s	MAX. VAC.	MAX. TEMP.		MIN. MAX. TEMP.	MAX. TEMP.	

COMMENTS: *1001 stop test change filters, Leak Check .007 @ 14"Hg Restart Reading 602.098

CLIENT RMA
PLANT SQI
LOCATION Lincoln

EPA METHOD 0010 FIELD DATA FORM

OPERATOR Fritz
RUN NO. Dave
K FACTOR .300 / 3.12

SHEET 3 OF 3
DATE 6-12-95

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE		SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F)		FILTER BOX TEMP. (deg F)	XAD INLET TEMP. (deg F)	
	15					INLET (deg F)	OUTLET (deg F)			Imp Exit	Probe Temp			
1	20		.41	1.23	678.32	90	87	183	6.0	55	245	257	66	
2	25		.50	1.50	681.58	89	86	182	6.0	55	250	255	64	
2	30		.52	1.56	685.25	88	86	183	8.0	56	249	255	66	
2	35		.50	1.50	688.97	89	87	183	8.0	60	246	256	67	
2	40		.50	1.50	692.62	90	88	182	8.0	57	246	257	67	3.12
3	45		.57	1.78	696.44	90	87	183	8.5	54	248	258	67	
3	50		.60	1.87	700.34	90	88	182	9.0	56	243	257	67	
3	55		.60	1.87	704.23	91	88	183	10.0	59	244	258	67	
3	60	14:16	.59	1.84	708.226	91	88	183	10.0	57	243	258	67	-.26
					LEAK Check OK .008@ 12" Hg									
	TOTAL θ 240		AVG. $\sqrt{\Delta p}$ .68841	AVG. ΔH 1.43583	TOTAL V_m 167.077	AVG. T_m 80.844		AVG. T_s 183.250	MAX. VAC. 10.0	MAX. TEMP. 67	256	MIN. 234 MAX. 259	MAX. TEMP. 67	

COMMENTS:

EPA METHOD 0010
SAMPLE RECOVERY AND INTEGRITY DATA FORM

Plant RMA-SQF Sample Date 6-12-93
Sample Location South Run Number Three
Sample Recovery Person JDD Recovery Date 6-12-93

922
351
949
942
897
915
4976

MOISTURE

	Impingers		Condensor			Silica Gel	
Final volume (wt)	4976	ml	~~3~~	ml	Final wt 348	g	g
Initial volume (wt)	~~200~~	ml	0	ml	Initial wt 300	g	g
Net volume (wt)	4776	ml		ml	Net wt 47	g	g

Total moisture 4776 + 6 + 48 = 4830
Color of silica gel blue 25%
Description of impinger water all clear

XAD F = 354
XAD T = 348/6

RECOVERED SAMPLE

972
915
3TT

Blank Filter container number _____ Sealed _____
Blank XAD container number _____ Sealed ✓
Filter/~~XAD~~ container number RMA-TBURN-M0010-RN3-FILT Sealed ✓
~~Filt~~/XAD container number RMA-TBURN-M0010-RMB-XAD Sealed ✓
Filter/XAD container number _____ Sealed _____
Filter/XAD container number _____ Sealed _____
Description of particulate on filter _____
Condenser water container number _____ Liquid level marked? _____
Front-half solvent
rinse container number RMA-TBURN-M0010-RN3-FHS Liquid level marked? ✓
Impinger contents and back-half
water rinse container number RMA-TBURN-M0010-RN3-CONDO Liquid level marked? ✓
Back-half solvent
rinse continer number RMA-TBURN-M0010-RN3-BHS Liquid level marked? ✓
Water blank container number _____ Liquid level marked? _____
Solvent blank container number _____ Liquid level marked? _____

Samples stored and locked On JDD - maintained cold
Remarks: _____

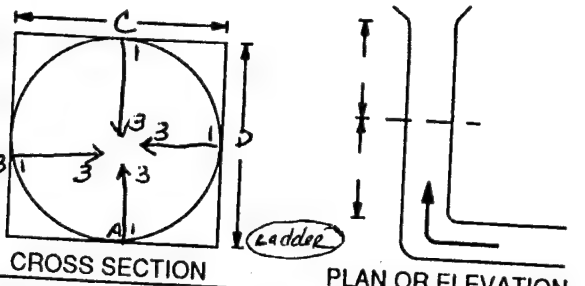
Date of laboratory custody _____
Laboratory personnel taking custody _____
Remarks: _____

WESTON

EPA METHOD 23 FIELD DATA FORM

SHEET 1 OF 3

CLIENT RMA/SOI
PLANT SOI
LOCATION STACK
OPERATOR DiCARLO
RUN NO. THREE DATE 6-12-93
AMBIENT TEMP. (deg F) 75°F
BARO. PRESS. (in Hg) 24.62
METER BOX NO. 12
METER BOX ΔH@ 2.012
METER BOX CAL. (Y) 1.010
PROBE LENGTH (ft) 30"
PROBE LINER MATERIAL Borosilicate
PROBE HEATER SETTING 250 ± 25
K FACTOR 3.01



CROSS SECTION PLAN OR ELEVATION

PITOT TUBE IDENTIFICATION NO. P52
PITOT TUBE CAL. FACTOR (C_p) .84
NOZZLE IDENTIFICATION NO. GLASS .355
AVG. NOZZLE DIAMETER (D), in. .355
PYROMETER IDENTIFICATION NO. 12
THERMOCOUPLE IDENTIFICATION NO. —
ASSUMED MOISTURE, % 62
ASSUMED TEMPERATURE, deg F 182°
STATIC PRESSURE (P_{static}), in H_2O -.14
INITIAL LEAK RATE .010 @ 15 in Hg
MID-POINT LEAK RATE .011 @ 10 in Hg
FINAL LEAK RATE .009 @ 10 in Hg
XAD NO. see Recovery Sheet

LEAK CHECKS
PITOT TUBE: INITIAL GOOD FINAL GOOD
METHOD THREE: INITIAL GOOD FINAL GOOD

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE INLET (deg F)	DRY GAS METER TEMPERATURE OUTLET (deg F)	SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F)	FILTER BOX TEMP. (deg F)	XAD INLET TEMP. (deg F)	
Port C										Probe			
0	0	7:56			801.354								
1	5		.44	1.32	804.76	66	66	183	4.0	62 247	251	48	-.15
1	10		.45	1.35	808.17	68	67	184	5.0	47 234	250	64	3.01
1	15		.43	1.29	811.60	70	67	183	5.0	48 241	250	62	
1	20		.43	1.29	814.89	71	68	182	5.0	48 244	251	64	
2	25		.52	1.57	818.525	72	69	183	5.5	47 242	255	65	
2	30		.52	1.57	822.15	72	69	183	5.5	48 240	250	66	
2	35		.54	1.63	825.91	73	70	184	6.0	45 242	249	66	
2	40		.54	1.63	829.63	73	70	183	6.0	46 240	250	66	
3	45		.60	1.81	833.81	73	71	183	6.5	48 240	252	66	
3	50		.58	1.75	837.47	73	71	184	7.0	48 244	253	66	
3	55		.56	1.69	841.28	75	72	184	7.0	50 243	253	66	-.20
3	60	8:56	.58	1.76	845.231	76	73	184	7.5	48 241	252	67	3.04
Port B					Leak Check OK @ 10" Hg @ 0.012								
					Leak Check OK @ 10" Hg @ .019								
0	0	9:26			845.501								
1	5		.47	1.43	849.09	76	76	182	7.0	65 256	245	49	-.14
	10		.46	1.39	852.67	78	77	183	7.0	47 225	238	63	3.04
	15		.52	1.58	856.27	79	77	183	8.0	45 237	238	67	
			AVG. $\sqrt{\Delta p}$	AVG. ΔH	TOTAL V_m	AVG. T_m		AVG. T_s	MAX. VAC.	MAX. TEMP.	MIN. MAX.	MAX. TEMP.	

WESTON

SHEET 2 OF 3

CLIENT RMA/SQI
PLANT SQI
LOCATION STACK

EPA METHOD 23 FIELD DATA FORM

OPERATOR DiCARLO
RUN NO. THREE
K FACTOR 3.07 / 3.10
DATE 6-9

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE		SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F)		FILTER BOX TEMP. (deg F)	XAD INLET TEMP. (deg F)
						INLET (deg F)	OUTLET (deg F)				Probe		
					856.27								
1	20		.53	1.61	860.00	80	78	184	9.0	47	243	237	67
2	25		.50	1.52	863.65	82	79	183	9.5	47	243	237	67
2	30		.54	1.66	867.45	82	79	183	11.0	46	243	237	67
2	35		.53	1.63*	871.195/872.434	83	80	184	11.5	48	242	240	67
2	40		.54	1.66	876.19	81	81	184	4.5	65	270	236	67
3	45		.60	1.84	880.25	83	81	183	6.0	44	230	237	67
3	50		.60	1.84	884.23	84	82	184	6.0	45	225	235	67
3	55		.62	1.92	888.30	86	83	185	6.5	48	230	234	65
3	60	11:10	.62	1.92	892.448	86	84	184	7.0	48	229	234	67
					LEAK Check OK .011@ 10" Hg								
PORT A					Filter Cracked During move Changed out				Leak Check OK .012@ 15" Hg				
0	0	12:00			893.6516								
1	5		.37	1.15	896.89	84	84	185	13.5	66	275	234	65
1	10		.38	1.18	900.14	85	84	184	4.0	62	242	237	66
1	15		.40	1.24	903.55	87	84	185	4.0	56	240	233	67
1	20		.37	1.15	906.84	87	84	184	4.0	55	225	236	67
2	25		.45	1.40	910.37	86	85	183	5.0	57	231	237	67
2	30		.44	1.36	913.89	88	85	184	5.0	56	235	225	67
2	35		.44	1.36	917.38	86	85	185	5.0	56	234	258	67
2	40		.43	1.33	920.85	88	86	185	5.0	57	236	248	67
3	45		.43	1.33	924.38	88	86	184	5.0	56	230	249	67
3	50		.42	1.30	427.8	88	86	184	5.0	55	235	248	67
3	55		.49	1.52	431.5	87	85	185	5.0	56	227	246	65
3	60	1300	.52	1.61	935.300	88	86	185	5.0	59	235	250	66
					LC-.007@7½	88				68	264	251	67
PORT D													
0	0	1315	—	—	935.544	—	—	—	—	—	—	—	—
1	5		.32	.99	938.6	86	86	184	3.0	68	264	251	67
1	10		.34	1.05	941.8	89	87	184	4.0	8	271	247	63
1	15		.32	.99	944.9	89	87	183	4.0	56	254	244	67
	TOTAL θ		AVG. $\sqrt{\Delta p}$	AVG. ΔH	TOTAL V_m	AVG. T_m		AVG. T_s	MAX. VAC.	MAX. TEMP.		MIN. MAX.	MAX. TEMP.

.07
.10
.21

COMMENTS * Change out filter @ 10:01 @ 871.195 @ 35mm mark Start at 10:50

CLIENT RMA/SQI
PLANT SQI
LOCATION STACK

EPA METHOD 23 FIELD DATA FORM

OPERATOR D'CARLO
RUN NO. THREE
K FACTOR

DATE 6-9-

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE		SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F)		FILTER BOX TEMP. (deg F)	XAD INLET TEMP. (deg F)
						INLET (deg F)	OUTLET (deg F)				Probe		
					944.9								
1	20		.32	.99	948.1	90	88	184	4	55	253	245	68
2	25		.38	1.19	951.3	89	87	183	4	54	251	244	67
2	30		.38	1.19	954.5	89	88	185	5	57	246	246	66
2	35		.36	1.12	957.5	89	87	185	5	58	250	245	65
2	40		.34	1.05	961.0	89	88	183	5	60	244	245	65
3	45		.45	1.40	964.5	90	88	184	5	59	247	243	66
3	50		.48	1.49	968.1	89	87	184	7	61	243	246	65
3	55		.47	1.46	971.6	90	88	184	7	61	247	244	68
3	60	1416	.47	1.46	975.278	91	89	184	8	60	245	244	67
					L.C. .009@10"Hg								
	TOTAL θ 240		AVG. $\sqrt{\Delta p}$ .68166	AVG. ΔH 1.43687	TOTAL V_m 170.963	AVG. T_m 81.396		AVG. T_s 183.792	MAX. VAC. 11.5	MAX. 65	TEMP. 275	MIN. 225 MAX. 258	MAX. TEMP. 68

COMMEN

WESTON
MANAGERS DESIGNERS/CONSULTANTS

EPA METHOD 23 (PCDD/PCDF)
SAMPLE RECOVERY AND INTEGRITY DATA FORM

Plant RMA-SRI
Sample Location Stack
Sample Recovery Person JDD

Sample Date 6-12-93
Run Number Three
Recovery Date 6-12-93

615
964.
968.
958.
929
654
5088

MOISTURE

	Impingers		Silica Gel	
Final volume (wt)	5088 ml	ml	Final wt 353 g	g
Initial volume (wt)	200 ml	0 ml	Initial wt 300 g	g
Net volume (wt)	4888 ml	ml	Net wt 53 g	g

Total moisture 4888 + 11 + 53 = 4952
Color of silica gel blue 20%
Description of impinger water all clear

XAD F = 371
XAT T = 360
11

RECOVERED SAMPLE

Blank Filter container number _____ Sealed ____
Filter container number RMA-TBURN-M23-RN3-FILT Sealed ✓
Blank XAD container number _____ Sealed ____
XAD container number RMA-TBURN-M23-RN3-XAD Sealed ✓
Description of particulate on filter _____
Front-half acetone rinse container number RMA-TBURN-M23-RN3-FHS Liq. lev. marked? ✓
Front-half methylene chloride rinse container number " Liq. lev. marked? ____
(6 of 6) Back-half water container number RMA-TBURN-M23-RN3-COLD Liq. lev. marked? ✓
Back-half methylene chloride solution rinse RMA-TBURN-M23-RN3-BHS Liq. lev. marked? ✓
Toluene QA / QC rinse RMA-TBURN-RN3-TOL Liq. lev. marked? ✓
Blank distilled water container number _____ Liq. lev. marked? ____
Blank acetone container number _____ Liq. lev. marked? ____
Blank methlylene choride container number _____ Liq. lev. marked? ____
Samples stored and locked 700 - On mainframe Cold
Remarks: _____

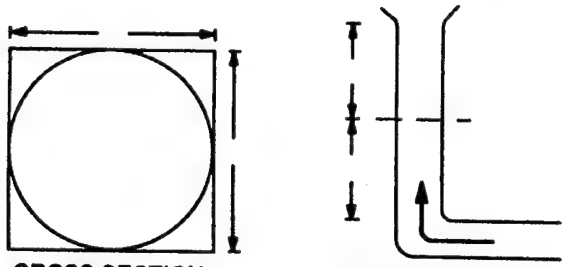
Date of laboratory custody _____
Laboratory personnel taking custody _____
Remarks: Notes Blank train setup and recovered along with source sample for test run 3

WESTON

SHEET 1 OF 2

Cr +6 FIELD DATA FORM

CLIENT RMA
PLANT SOI
LOCATION STACK
OPERATOR KH / WP
RUN NO. THREE DATE 6/24/93
AMBIENT TEMP. (deg F) ~80
BARO. PRESS. (in Hg) 24.67
METER BOX NO. NUTECH 16
METER BOX ΔH@ 1.942
METER BOX CAL. (Y) .9923
PROBE LENGTH (ft) 3
PROBE LINER MATERIAL TEFLON
PROBE HEATER SETTING N/A
K FACTOR 2.85 1820 TS 90° TM



LEAK CHECKS
PITOT TUBE: INITIAL ✓ FINAL ✓
METHOD THREE: INITIAL N/A FINAL N/A

PITOT TUBE IDENTIFICATION NO. PS3
PITOT TUBE CAL. FACTOR (C_p) .84
NOZZLE IDENTIFICATION NO. CRT6 355A
AVG. NOZZLE DIAMETER (D), in. .354
PYROMETER IDENTIFICATION NO. NUTECH 16
THERMOCOUPLE IDENTIFICATION NO.
ASSUMED MOISTURE, % 6.3
ASSUMED TEMPERATURE, deg F 182
STATIC PRESSURE (P_{static}), in H_2O -.18
INITIAL LEAK RATE .011 @ 15 in Hg
MID-POINT LEAK RATE — @ — in Hg
FINAL LEAK RATE .003 @ 12 in Hg

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE		SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F)	KOH RECIR. RATE (ml/min)
						INLET (deg F)	OUTLET (deg F)				
D	0	1137			847.000						
1	5		.24	.68	849.5	85	85	182	2.5	67	50
1	10		.24	.68	852.0	87	86	182	3.0	66	
2	15		.22	.63	854.6	87	85	183	3.0	64	
2	20		.43	.23	857.5	86	84	182	6.0	62	
3	25		.40	.14	860.7	87	85	182	6.0	60	
3	30	1207	.42	.20	864.029	88	85	182	6.0	62	
				LC good @		9" Hg					
C	0	12:16			864.251						
1	5		.51	1.45	867.6	87	85	181	5.0	65	50
1	10		.54	1.54	871.2	90	86	182	7.0	61	
2	15		.49	1.39	874.6	89	86	182	7.0	59	
2	20		.49	1.39	878.1	88	86	182	7.5	60	
3	25		.44	1.25	881.5	89	86	183	7.0	65	
3	30	1246	.36	1.02	884.584	89	86	182	6.0	67	
				LC good @		9" Hg					
	TOTAL θ		AVG. $\sqrt{\Delta p}$	AVG. ΔH	TOTAL V_m	AVG. T_m		AVG. T_s	MAX. VAC.	MAX. TEMP.	

COMMENTS:

WESTON

Cr +6 FIELD DATA FORM

SHEET 2 OF 2

CLIENT RMA
PLANT SOI
LOCATION STACK

OPERATOR KH / WP
RUN NO. THREE DATE 6/12/93
K FACTOR

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE INLET (deg F)	DRY GAS METER TEMPERATURE OUTLET (deg F)	SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F)	KOH RECIR. RATE (ml/min)
A	0	13:28			884.879	6	7	5		4	
1	5		.56	1.60	888.5	88	87	181	6.0	68	50
1	10		~~.60~~ .58	1.65	892.2	91	88	182	7.0	59	
2	15		.51	1.45	895.7	91	88	183	8.0	61	
2	20		.53	1.51	899.4	91	88	183	8.0	62	
3	25		.39	1.11	902.7	90	88	182	7.0	68	
3	30	13:58	.41	1.68	906.422	91	88	182	9.0	68	
				CC Good @		11" Hg					
B	0	14:09			906.615						
1	5		.65	1.85	911.8	91	89	182	8.0	67	50
1	10		.61	1.75	915.7	94	90	182	10.0	62	
2	15		.56	1.60	919.5	91	88	181	10.0	64	
2	20		.49	1.40	923.0	94	90	183	9.5	65	
3	25		.49	1.40	926.6	96	91	183	9.0	66	
3	30	14:40	.45	1.30	930.107	94	90	181	8.5	67	
	TOTAL θ 120		AVG. $\sqrt{\Delta p}$ .671	AVG. ΔH 1.3291	TOTAL V_m 82.397	AVG. T_m 88.4		AVG. T_s 182.1	MAX. VAC.	MAX. TEMP.	

COMMENTS: FINAL PT = 9.5

EPA Cr^{+6} Method
SAMPLE RECOVERY AND INTEGRITY DATA FORM

Plant RMA - SQI
Sample Location STACK
Sample Recovery Person KH
Sample Date 6/12/93
Run Number THREE
Recovery Date 6/12/93

MOISTURE

Impingers	KOH	Silica Gel
Final volume (wt)	950 + 950 + 885 ml	Final wt 337 g ____ g
Initial volume (wt)	300 + 150 + 75 ml	Initial wt 302 g ____ g
Net volume (wt)	2260 ml	Net wt 37 g ____ g
	2297	

Total moisture ____
Color of silica gel PINK / BLUE

RECOVERED SAMPLE

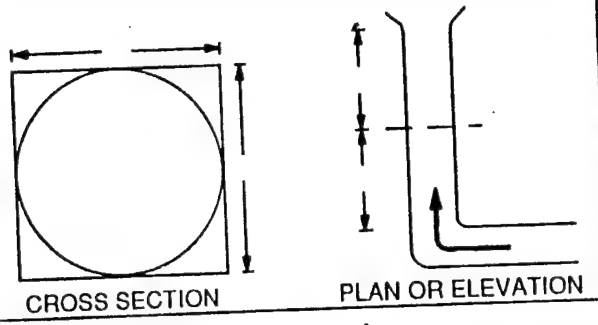
Description of particulate LIGHT TO MODERATELY HEAVY
KOH impingers and rinse container number(s) RMA-TBURN-CR6-RN3-KOH ~~(4 of 4)~~
Sample Filtered? ✓ Liquid level marked? ✓
Blank KOH container number(s) RMA-TBURN-CR6-SB KOH Liquid level marked? ✓
Samples stored and locked ✓
Remarks: FINAL PH = 9.5
TOTAL SAMPLE VOLUME TAKEN TO 4L.
Date of laboratory custody ____
Laboratory personnel taking custody ____
Remarks: ____

WESTON DESIGNS/CONSULTANTS

SHEET 1 OF 2

MULTI METALS FIELD DATA FORM

CLIENT EMA - SQF
PLANT SQF
LOCATION Joliet
OPERATOR BARBER
RUN NO. Three DATE 6-12-93
AMBIENT TEMP. (deg F) 78
BARO. PRESS. (in Hg) 24.62
METER BOX NO. 9
METER BOX ΔH@ 1.992
METER BOX CAL. (Y) 1.001
PROBE LENGTH (ft) 30"
PROBE LINER MATERIAL BORO
PROBE HEATER SETTING 320
K FACTOR 3.46 (75) 3.55 (90)



PITOT TUBE IDENTIFICATION NO. P 70
PITOT TUBE CAL. FACTOR (C_p) .840
NOZZLE IDENTIFICATION NO. BORO 375
AVG. NOZZLE DIAMETER (D), in. .375
PYROMETER IDENTIFICATION NO. #9
THERMOCOUPLE IDENTIFICATION NO. #1
ASSUMED MOISTURE, % 62
ASSUMED TEMPERATURE, deg F 183
STATIC PRESSURE (P_{static}), in H_2O -.17
INITIAL LEAK RATE .015 @ 15 in Hg
MID-POINT LEAK RATE — @ — in Hg
FINAL LEAK RATE .005 @ 14 in Hg
FILTER NO. N/A

LEAK CHECKS
PITOT TUBE: INITIAL Good FINAL Good
METHOD THREE: INITIAL NA FINAL NA

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE INLET (deg F)	DRY GAS METER TEMPERATURE OUTLET (deg F)	SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F) Probe	IMPINGER EXIT GAS TEMP. (deg F)	FILTER BOX TEMP. (deg F)
	0	0756			651.565							
B 1	5	0	.53	1.83	655.4	69	68	184	5	68	230	240
1	10		.57	1.80	659.3	73	69	185	5	58	225	240
2	15		.58	2.06	663.0	79	70	184	5	58	220	242
2	20		.55	1.90	667.5	71	79	184	5	59	215	240
3	25		.61	2.11	671.8	81	72	184	5	57	216	245
3	30	0826	.61	2.11	676.037	80	72	184	5	55	219	241
					LC-.005@7"Hg							
			—	—	676.358	—	—	—	—	—	—	—
	0	0840			680.1	75	74	184	5	68	218	232
A 1	5		.49	1.70	683.9	81	75	183	5	58	212	233
1	10		.45	1.56	687.8	82	76	184	5	60	226	238
2	15		.51	1.76	691.7	83	76	184	5	63	233	241
2	20		.50	1.73	695.7	86	78	183	5	66	236	234
3	25		.56	1.94	699.750	86	78	183	5	63	232	238
3	30	0910	.54	1.87	LC-.008@7"Hg							
	TOTAL θ		AVG. $\sqrt{\Delta p}$	AVG. ΔH	TOTAL V_m	AVG. T_m		AVG. T_s	MAX. VAC.	MAX. TEMP.		MIN. MAX.

-.20

COMMENT

WESTON

SHEET 2 OF 2

CLIENT RMA SOI
PLANT Shute
LOCATION Shute

MULTI METALS FIELD DATA FORM

OPERATOR [illegible]
RUN NO. Three
DATE 6-2-93
K FACTOR 3.55/90

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	VELOCITY HEAD (delta P) (in. H_2O)	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (cubic ft.)	DRY GAS METER TEMPERATURE INLET (deg F)	DRY GAS METER TEMPERATURE OUTLET (deg F)	SOURCE TEMP. (deg F)	PUMP VACUUM (in. Hg gauge)	IMPINGER EXIT GAS TEMP. (deg F)	Probe	FILTER BOX TEMP. (deg F)	
	0	0926			700.012								
D 1	5		.38	1.35	703.4	81	80	183	5	66	270	238	
1	10		.38	1.35	707.0	84	80	187	5	61	220	241	
2	15		.45	1.60	710.6	85	80	183	5	59	212	240	-.14
2	20		.45	1.60	714.3	89	82	184	5	62	212	241	
3	25		.49	1.74	718.1	90	83	183	5	65	226	243	
3	30	0956	.48	1.70	721.930	91	84	183	6	63	233	242	
					LC-.007@8%								
	0	1017	—	—	722.185	—	—	—	—	—	—	—	
C 1	5		.48	1.70	725.9	85	84	183	7	68	260	233	
1	10		.41	1.46	729.5	89	85	183	7	62	264	242	
2	15		.51	1.81	733.2	89	84	183	9	61	243	233	-.18
2	20		.51	1.81	737.1	88	84	182	10	59	222	251	
3	25	1046/1100	.58	2.06	740.9/744.000	88	84	182	12	58	256	259	
3	30	1101	.57	2.02	744.80/745.157	87	84	183	13	57	262	259	
					LC-.005@14								
					-.280			61.4% moist					
					22.687			Actual: 21700					
					21.918			Std: 8200					
					24.472			Iso 94.6					
					~~24.472~~								
					23.342								
													√=.90
	TOTAL θ		AVG. $\sqrt{\Delta p}$ 0.709789	AVG. ΔH 1.77375	TOTAL V_m 92.469		AVG. T_m 82.69	AVG. T_s 183.33	MAX. VAC.	MAX. TEMP.		MIN. MAX.	

COMMENT Stopped 29.8 minutes into Test To drain Impinger

o:\shared\airteam\forms\MMTLFDF2.DRW

EPA MULTI-METALS
SAMPLE RECOVERY AND INTEGRITY DATA FORM

Plant RMA - JQI
Sample Location Stack
Sample Recovery Person JDD
Filter Number(s) N/A

Sample Date 6-12-93
Run Number Three
Recovery Date 6-12-93

MOISTURE

Impingers	HNO_3/H_2O_2	Dry Imp. 3/4	$KMNO_4$ 246 ~~300~~	Silica Gel
Final vol (wt)	2285 ml	374 ml	~~270~~ ml	Final wt 321 g
Initial vol (wt)	200 ml	0 ml	200 ml	Initial wt 300 g
Net volume (wt)	2085 ml	374 ml	70 ml	Net wt 21 g

Total moisture 2505 + 21 = 2526 ~~2546~~ 2446

Color of silica gel
Description of particulate light brown
Description of impinger water (condensate/HNO_3) all clear

RECOVERED SAMPLE

Container #

972 (1) Filter container number RMA-TOURN-MMTL-RN3-FILT Sealed ✓
915 (2) Front-half acetone container number(s) ~~RMA-TOURN-MMTL-RN3-~~ N/A Liquid level marked?
371 (3) Front-half 0.1N nitric container number (s) ~~RMA-TOURN-MMTL-RN3-~~ FHN Liquid level marked? ✓
2258 (4) Back-half condensate impingers (1 through 3) and nitric rinse container number(s) RMA-TOURN-MMTL-RN3-BHN Liquid level marked? ✓
(5A) Impinger 4 condensate and nitric rinse container number(s) RMA-TOURN-MMTL-RN3-Imp 4 Liquid level marked? ✓
(5B) $KMnO_4$ impingers 5 and 6 and $KMnO_4$ and water rinse container number(s) RMA-TOURN-MMTL-RN3-KMnO4 Liquid level marked? ✓
(5C) 8NHCl rinse (if required) container number RMA-TOURN-MMTL- Liquid level marked?
(7) Blank acetone container number RN3-HCl/H2O Liquid level marked? ✓
(8) Blank 0.1N nitric container number Liquid level marked?
(9) Blank nitric/H_2O_2 container number Liquid level marked?
(10) Blank $KMNO_4$ container number Liquid level marked?
(11) Blank 8N HCl container number Liquid level marked?
(12) Blank Filter container number Liquid level marked?

Samples stored and locked OK JDD
Date of laboratory custody
Laboratory personnel taking custody
Remarks:

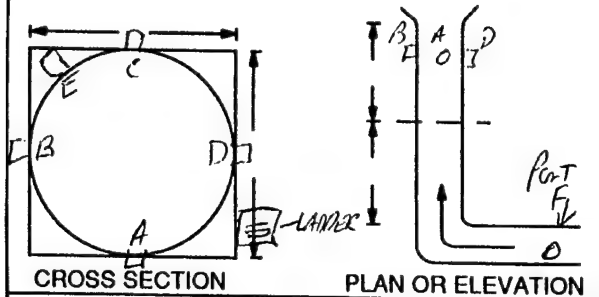
NOTE: Container (6) is the silica gel.

WESTON MANAGERS & ENGINEERS/CONSULTANTS

SHEET 1 OF 2

VOST FIELD DATA FORM

CLIENT RMA - SQI
PLANT Denver Colorado
LOCATION Stack Breeching
OPERATOR Jack Mills
RUN NO. Three DATE 6/12/93
AMBIENT TEMP. (deg F) 80
BARO. PRESS. (in Hg) 24
METER BOX NO. VOST 4
METER BOX ΔH@ N/A
METER BOX CAL. (Y) .9963
PROBE LENGTH (ft) 3 FT
PROBE LINER MATERIAL Borosilicate
PROBE HEATER SETTING > 150 °C
K FACTOR N/A



TENAX TUBE SAMPLE NUMBERS
SET ONE RMA-TBurn-M0030-R3-TP1 (13918)
SET TWO RMA-TBurn-M0030-R3-TP2 (13914)
SET THREE RMA-TBurn-M0030-R3-TP3 (13912)
SET FOUR RMA-TBurn-M0030-R3-TP4 (13929)
SET FIVE RMA-TBurn-M0030-R3-TP5 (13916)
SET SIX RMA-TBurn-M0030-R3-TP6 (13919)
STACK BLANK RMA-TBurn M0030-BT-TP2 (13903)
RMA TBurn-M0030-BT-COND 2
RMA-TBurn-M0030-R3-COND 1-5
RMA-TBurn-M0030-5/32 COND 2
RMA-TBurn-M0030-5/32-TP2 (13915)

LEAK CHECKS	SET ONE:	SET TWO:	SET THREE:	SET FOUR:	SET FIVE:	SET SIX:
INITIAL:	Good	Good	Good	Good	Good	Good
FINAL:	Good	Good	Good	Good	Good	Good

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	ROTO-METER SETTING	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (liter)	DRY GAS METER TEMPERATURE INLET (deg C)	DRY GAS METER TEMPERATURE OUTLET (deg C)	PROBE TEMP. (deg C)	PUMP VACUUM (in. Hg gauge)	FIRST CONDENS. EXIT GAS TEMP. (deg C)	SECOND CONDENS. EXIT GAS TEMP. (deg C)
Port F	0	0830			263.342						
	5		80	1.5	268.9	N/A	35	182	4.0	14	13
	10		80	1.5	274.6		35	178	5.5	10	13
	15		80	1.5	280.2		36	179	5.5	11	14
	20	0850	78	1.5	285.680		36	181	5.5	11	14
				(1.50)	(22,338)		(35.50)				
	0	0859	—	—	286.385	N/A	—	—	—	—	—
	5		78	1.5	291.8		37	178	7.0	12	14
	10		75	1.4	297.2		37	172	8.5	11	14
	15		75	1.4	302.7		37	175	9.0	11	14
	20	0919	78	1.5	307.975		37	184	9.0	11	12
				(1.45)	(21.590)		(37.00)				
	0	0928	—	—	308.682	N/A	—	—	—	—	—
	5		80	1.5	314.3		38	186	5.5	14	12
	10		78	1.5	319.5		38	188	7.0	10	11
	15		55	1.4	324.8		38	192	7.0	11	11
	20	0948	75	1.4	329.995		38	194	7.5	11	11
	TOTAL θ			AVG. ΔH (1.45)	TOTAL V_m (21.313)		AVG T_m (38.00)	AVG. T_s	MAX. VAC.	MAX. TEMP.	MAX. TEMP.

COMMENTS: Probe was leak checked before + after each run.

g:\shared\airteam\forms\VOSTFD1.DRW

WESTON

VOST FIELD DATA FORM

SHEET 2 OF 2

CLIENT RMA-SOI
PLANT DENVER COLORADO
LOCATION STACK BREECHING

OPERATOR Jack Mills
RUN NO. Three DATE 6/12/93
K FACTOR N/A

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	ROTO-METER SETTING	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (liters)	DRY GAS METER TEMPERATURE		PROBE TEMP. (deg C)	PUMP VACUUM (in. Hg gauge)	FIRST CONDENS. EXIT GAS TEMP. (deg C)	SECOND CONDENS. EXIT GAS TEMP. (deg C)
						INLET (deg C)	OUTLET (deg C)				
	0	1003			330,842						
	5		80	1.5	336.4	N/A	39	192	3.5	13	11
	10		78	1.5	342.0		39	193	3.5	10	11
	15		78	1.5	347.3		39	195	5.5	11	14
	20	1023	75	1.5	352.740		39	195	6.0	12	13
				1.50	21.898		39.00				
	0	1034	—	—	353,520	N/A	—	—	—	—	—
	5		80	1.5	359.2		39	189	4.0	13	14
	10		78	1.5	365.0		39	191	5.5	11	13
	15		75	1.4	369.9		39	193	5.5	12	13
	20	1054	75	1.4	375.410		39	193	6.0	12	13
				1.45	21.590		39.00				
	0	1104	—	—	375.778	N/A	—	—	—	—	—
	5		80	1.5	381.4		39	187	4.0	15	15
	10		80	1.5	386.7		40	193	5.5	14	16
	15		78	1.5	392.0		40	195	5.5	14	16
	20	1124	80	1.5	397.875		40	197	6.5	13	16
				1.50	22.097		39.75				
	TOTAL θ			AVG. ΔH	TOTAL V_m	AVG. T_m		AVG. T_s	MAX. VAC.	MAX. TEMP.	MAX. TEMP.

COMMENTS: All leak checks were < .02 Cfm/min at a vacuum > 10 in Hg

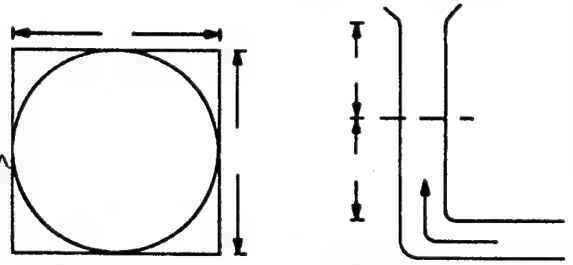
g:\shared\art\eam\forms\VOSTFD2.DRW

WESTON

SHEET 1 OF 2

VOST FIELD DATA FORM

CLIENT RMA
PLANT Denver
LOCATION AUDIT 567
OPERATOR Mills
RUN NO AUDIT 567 DATE 6/9/93
AMBIENT TEMP. (deg F) 75
BARO. PRESS. (in Hg) 24.74
METER BOX NO. VOST 4
METER BOX ΔH@ N/A
METER BOX CAL. (Y) ~~1.000~~ .9963
PROBE LENGTH (ft) 2 FT
PROBE LINER MATERIAL TeFlon
PROBE HEATER SETTING
K FACTOR



TENAX TUBE SAMPLE NUMBERS
SET ONE RMA-TBuck-M0030-AU1-TP1 (13946)
SET TWO RMA-TBuck-M0030-AU1-TP2 (13938)
SET THREE RMA-TBuck-M0030-AU1-TP3 (13934)
SET FOUR RMA-TBuck-M0030-AU1-TP4 (13950)
SET FIVE
SET SIX
STACK BLANK

LEAK CHECKS	SET ONE:	SET TWO:	SET THREE:	SET FOUR:	SET FIVE:	SET SIX:
INITIAL:	Good	Good	Good	Good		
FINAL:	Good	Good	Good	Good		

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	ROTO-METER SETTING	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (liter)	DRY GAS METER TEMPERATURE INLET (deg C)	DRY GAS METER TEMPERATURE OUTLET (deg C)	PROBE TEMP. (deg C)	PUMP VACUUM (in. Hg gauge)	FIRST CONDENS. EXIT GAS TEMP. (deg C) ⑤	SECOND CONDENS. EXIT GAS TEMP. (deg C) ⑥
	0	1143			892.075						
TUBE	2.5		78	1.4	894.5	~~2~~ NA	22	7100°C	<1	11	12
Pair	5.0		78	1.4	896.9	~~20~~	22	7100°C	<1	10	11
ONE	7.5		~~78~~ 68	~~1.4~~ 1.3	899.5	~~20~~	22	7100°C	<1	10	11
	10	1153	68	1.3	901.755	~~2~~ 1	23	7100°C	<1	10	10
				(1.35) ⑦	(9.680) ⑧		(22.25) ⑨				
	0	1204			902.510						
TUBE	2.5		65	1.3			26	7100°C	<1	10	12
	5.0		STOP TEST, BLEED OFF VALVE LEFT OPEN, VOID TUBE PAIR								
	7.5										
	10										
	0	1212			904.938						
TUBE	2.5		65	1.3	907.3	NA	26	7100°C	<1	12	10
PAIR	5.0		65	1.3	909.5		26	7100°C	<1	11	9
TWO	7.5	1222	65	1.3	911.8		26	7100°C	<1	11	9
	10		65	1.3	914.250		27	7100°C	<1	9	9
				(1.34) ⑦	(9.312) ⑧		(26.25) ⑨				
	TOTAL θ			AVG. ΔH	TOTAL V_m		AVG. T_m	AVG. T_s	MAX. VAC.	MAX. TEMP.	MAX. TEMP.

COMMENTS: ~~Air~~

WESTON

VOST FIELD DATA FORM

CLIENT RMA
PLANT DENVER COLORADO
LOCATION AUDIT 567

OPERATOR M. ILS
RUN NO. AUDIT 567
K FACTOR N/A

SHEET 2 OF 2
DATE 6/8/93

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	ROTO-METER SETTING	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (liters)	DRY GAS METER TEMPERATURE		PROBE TEMP. (deg C)	PUMP VACUUM (in. Hg gauge)	FIRST CONDENS. EXIT GAS TEMP. (deg C)	SECOND CONDENS. EXIT GAS TEMP. (deg C)
						INLET (deg C)	OUTLET (deg C)				
	0	1235			915038						
A1	2.5		65	1.3	917.6	N/A	28	>100°C	1.0	12	10
A2	5.0		65	1.3	919.8		28	>100°C	1.0	11	10
A3	7.5		65	1.3	922.1		28	>100°C	1.0	10	11
A4	10	1245	65	1.3	924.492		28	>100°C	1.0	10	10
				(1.3)	(9.454)		(28)				
	0	1302			925.352						
B1	2.5		65	1.3	927.5	NA	29	>100°C	2.5	11	10
B2	5.0		65	1.3	929.9		29	>100°C	2.5	11	10
B3	7.5		65	1.3	932.3		29	>100°C	2.5	9	10
B4	10	1312	65	1.3	934.582		30	>100°C	2.5	11	11
				(1.3)	(9.230)		(29.25)				
	TOTAL θ			AVG. ΔH	TOTAL V_m	AVG. T_m		AVG. T_s	MAX. VAC.	MAX. TEMP.	MAX. TEMP.

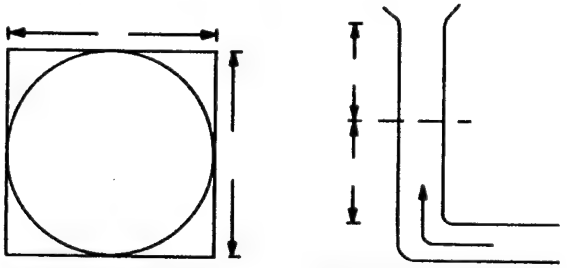
COMMENTS: All leak checks were < .02 liters/min at a vacuum > 10 in Hg

WESTON

SHEET 1 OF 2

VOST FIELD DATA FORM

CLIENT RMA
PLANT Denver Colorado
LOCATION AUDIT 2
OPERATOR Mills
RUN NO. AUDIT 2 568 DATE 6/9/93
AMBIENT TEMP. (deg F) 75
BARO. PRESS. (in Hg) 24.74
METER BOX NO. VOST 4
METER BOX ΔH@ N/A
METER BOX CAL. (Y) ~~1.000~~ .9963 dimn
PROBE LENGTH (ft) 3 FT
PROBE LINER MATERIAL Teflon
PROBE HEATER SETTING
K FACTOR



TENAX TUBE SAMPLE NUMBERS
SET ONE RMA-TBUCK-MO030-AU2-TP1 (13533)
SET TWO RMA-TBUCK-MO030-AU2-TP2 (13936)
SET THREE RMA-TBUCK-MO030-AU2-TP3 (13937)
SET FOUR RMA-TBUCK-MO030-AU2-TP4 (13938)
SET FIVE
SET SIX
STACK BLANK

LEAK CHECKS	SET ONE:	SET TWO:	SET THREE:	SET FOUR:	SET FIVE:	SET SIX:
INITIAL:	Good	Good	Bad	Good		
FINAL:	Good	Good	Bad	Good		

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	ROTO-METER SETTING	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (liter)	DRY GAS METER TEMPERATURE INLET (deg C)	DRY GAS METER TEMPERATURE OUTLET (deg C)	PROBE TEMP. (deg C)	PUMP VACUUM (in. Hg gauge)	FIRST CONDENS. EXIT GAS TEMP. (deg C)	SECOND CONDENS. EXIT GAS TEMP. (deg C)
	0	1332			935.333						
	2.5		65	1.3	937.6	N/A	30	> 100°C	2.0	13	11
	5.0		65	1.3	939.9		30	> 100°C	2.0	12	10
	7.5		65	1.3	942.2		31	> 100°C	2.0	13	11
	10	1342	65	1.3	944.600		30	> 100°C	2.0	12	13
				(1.3)	(9.267)		(30.25)				
	0	1354			945.202						
	2.5		65	1.3	947.6	N/A	31	> 100°C	2.0	16	14
	5.0		65	1.3	950.1		31	> 100°C	2.0	15	16
	7.5		65	1.3	952.4		31	> 100°C	2.0	15	16
	10	1404	65	1.3	954.772		31	> 100°C	2.0	15	14
				(1.3)	(9.57)		(31)				
	0	1446			955.505						
	2.5		65	1.3	958.0	N/A	29	> 100°C	2.0	11	9
	5		65	1.3	960.3		29	> 100°C	2.0	10	9
	7.5		65	1.3	962.7		29	> 100°C	2.0	9	9
	10	1456	65	1.3	964.960		29	> 100°C	2.0	10	8
	TOTAL θ			AVG. ΔH (1.3)	TOTAL V_m (9.455)		AVG. T_m (29)	AVG. T_s	MAX. VAC.	MAX. TEMP.	MAX. TEMP.

COMMENTS:

g:\shared\airteam\forms\VOSTFD1.DRW

WESTON

VOST FIELD DATA FORM

SHEET 2 OF 2

CLIENT RMA
PLANT Denver Colorado
LOCATION AUDIT 2 568

OPERATOR Mills
RUN NO. AUDIT 2 DATE 6/9/93
K FACTOR

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	24-HOUR CLOCK TIME	ROTO-METER SETTING	ORIFICE METER PRESSURE DIFFERENTIAL (delta H) (in. H2O)	GAS METER READING (liters)	DRY GAS METER TEMPERATURE		PROBE TEMP. (deg C)	PUMP VACUUM (in. Hg gauge)	FIRST CONDENS. EXIT GAS TEMP. (deg C)	SECOND CONDENS. EXIT GAS TEMP. (deg C)
						INLET (deg C)	OUTLET (deg C)				
	0	1508			965.705						
	2.5		65	1.3	968.0	NA	29	> 100°C	2.0	9	8
	5.0		65	1.3	970.3		29	> 100°C	2.0	8	8
	7.5		65	1.3	972.6		29	> 100°C	2.0	7	8
	10	1518	65	1.3	974.930	↓	29	> 100°C		7	8
				1.3 V	9.225 V		29 V				
	TOTAL θ			AVG. ΔH	TOTAL V_m	AVG. T_m		AVG. T_s	MAX. VAC.	MAX. TEMP.	MAX. TEMP.

COMMENTS: All Gas Checks were 4.02 LPM at a Vacuum > 10 in Hg

g:\shared\airteam\forms\VOSTF02.DRW

GAS ANALYSIS DATA FORM

Plant: SQI Sample Location: S Duct

Date: 6/12/93 Operator: O'Neill

Sample Type: SINGLE POINT or MULTIPOINT: GRAB or INTEGRATED

Analytical Method: Orsat Leak Check: Good

Run Number	Sample Location/Train ID	% CO2 Reading 1	%O2 Reading 2	%O2 Net (1)	%N2 100 - Reading 2
3	Plant - RN 3 + MMTL	~~9.5~~	~~13.3~~	~~4.8~~	1pm Orsat DATA
↓	〃	~~9.6~~	~~13.5~~	~~4.9~~	Unrepresentative Repeat
↓	〃	~~9.6~~	~~13.5~~	~~4.9~~	Analysis Below
3B	Semivolatile/Cr6	10.2	13.6	3.4	
	D/F (M23)	10.2	13.6	3.4	
		10.0	13.6	3.6	
3A	Semivol/M23	10.2	13.5	3.3	
		10.2	13.6	3.4	
		10.2	13.6	3.4	
	Avg	(10.17)		(3.42)	
3	Plant RN3 / MMTL	10.2	13.6	3.4	
		10.0	13.6	3.6	
		10.0	13.7	3.7	
	Avg	(10.07)		3.56	
AVERAGES					

%N2 = 100 - (%CO2 + % O2 + %CO)

MWd = 0.440(%CO2) + 0.320(%O2) + 0.280(%N2 + %CO)

(1) Net %O2 = Reading 2 - Reading 1

Integrated Bag Limits

CO2 > 4% - 0.3% by vol

<=4% - 0.2% by vol

O2 >= 15% - 0.2% by vol

< 15% - 0.3% by vol

PROCEDURAL CHECKLIST
FOR EPA METHODS 1, 2, 3 AND 4

METHOD 1 DETERMINATIONS

Date 6/10/93 Time 0835 Operator _____ Observer PMM

Stack diameter properly determined? Yes
Distance to nearest upstream disturbance properly determined? Yes
Number of stack diameters? _____
Distance of nearest downstream disturbance properly determined? Yes
Number of sampling points properly selected? _____
Points properly marked on pitot tube? Yes - all
Verification of cyclonic flow acceptable? Yes

METHOD 2 SAMPLING

Date 6/10/93 Time 0835 Operator _____ Observer PMM

Equipment identity matches pretest calibration list? Yes

Pitot tube, lines, and manometer assembled correctly? Yes
Pitot tube and components mounted interference-free manner? Yes

Differential pressure gauge has correct sensitivity? Yes
Differential pressure gauge leveled and zeroed? Yes - all
Pretest leak check? Yes - all Cyclonic flow checked? Yes
Orientation of pitot tube correct during traverse? Yes - all
Sampling port adequately sealed around pitot tube? Yes - all
Process operating at correct conditions? Yes
Stable reading taken at each traverse point? Yes
Static pressure measured? Yes Method used? _____
Moisture content determined? Yes Method used? Pretest - Cr^{+6} train
Orsat samples taken? NO If not, explain why: Used data from previous test program to set up isokinetic sample rate
Post-test leak-check performed? Yes Leak check results: Good
Data recorded properly? Yes Calculations correct? Yes

(Continued)

PROCEDURAL CHECKLIST
FOR EPA METHODS 1, 2, 3 AND 4

METHOD 3 SAMPLING

Date 6/10/93 Time 0845 Operator _____ Observer PMM

Method: Single-point grab _____ Single-point integrated _____
Multi-point integrated ✓

Is a filter used to remove particulate matter? NO

Sampling train leak checked? Yes - all

Sampling train purged with stack gas prior to collecting the sample? Yes

Sampling port properly sealed? Yes

Sampling rate held constant? Yes

METHOD 3 ANALYSIS

Molecular weight determination by Orsat: Yes

Reagents at the proper level? Yes Analyzer level? Yes

Analyzer leak checked? Yes Analyzed within 8 hours? Yes

Sample line purged? Yes Complete absorption of gases? Yes

The analysis repeated until following analysis criteria met? Yes

CO_2 - Any three analyses differ by:

a. ≤ 0.3% when CO_2 ≥ 4.0% yes

b. ≤ 0.2% when CO_2 ≤ 4.0% yes

O_2 - Any three analyses differ by:

a. ≤ 0.3% when O_2 ≥ 15.0% yes

b. ≤ 0.2% when O_2 ≤ 14.0% yes

All readings averaged and reported to nearest 0.1% Yes

PROCEDURAL CHECKLIST
FOR EPA METHODS 1, 2, 3 AND 4

METHOD 4 SAMPLING

Date 6/10/93 Time 0845 Operator _____ Observer PMM

Method conducted in conjunction with pollutant emission test? As part of MM5, M23, M5/0050 MMTC and Cr+6
Impingers properly placed? Yes - each train
Impinger contents: 1st ~~2nd~~ 3rd
4th 5th ~~6th~~ NA
Modifications? NA
Cooling System: Crushed ice ✓ Other
Sampling time per point see each train Number of points 12
Probe heater on? Yes-all Temperature ~250 Stable? Yes
Filter heater on? Yes-all Temperature ~250 Stable? Yes
Crushed ice in ice bath around impingers? Yes
Pretest leak check conducted? Yes Leakage rate? see trains
Sampling rate constant? NO Isokinetic sampling? Yes
All data recorded properly? Yes
Post-leak check conducted? Yes Leakage rate? see trains
Analysis - Impinger Contents:
Method: Volumetric see trains
Glassware cleaned following protocol for concurrent emission test? Yes
Gravimetric? see trains Trip balance calibrated?
Measurement of silica gel? Yes Balance?
Color of silica gel? see trains Condition?
All analytical data recorded properly? Yes
All readings averaged and reported to nearest 0.1%
yes - will be reported as appropriate

PROCEDURAL CHECKLIST
FOR ~~SEMI-VOLATILE ORGANIC AND~~ PCDD/PCDF SAMPLING

Date 6/10/93 Time 1402 Operator S. DiCarlo Observer PMM

Equipment Setup

Equipment identify matches pretest calibration list? Yes

Probe Nozzle: Stainless steel _____ Other Glass

Button-hook ✓ Size .355

Cleaned according to sampling protocol? Yes

Probe Liner: Borosilicate ✓ quartz _____ other _____

Probe heating system: Wrapped

Cleaned according to sampling protocol? Yes

Checked? Yes Temperature ~225 Stable? Yes

Pitot Tube: Type S ✓ Other _____

Properly attached to probe (no interference to nozzle)? Yes

Modifications: No

Pitot tube coefficient .84

Differential Pressure Gauge: Inclined manometers ✓ 0-10"

Magnehelics _____ Ranges _____ _____ _____

Other _____ Ranges _____ _____ _____

Cyclone (inlet only): Borosilicate Glass NA Other _____

Cleaned according to sampling protocol? NA

Filter Holder: Borosilicate Glass ✓ Other _____

Frit material: Teflon ✓ Other _____

Gasket Material: Silicone _____ Other Viton (teflon coated)

Cleaned according to sampling protocol? Yes

Filter or ~~Thimble Type~~(s): NA Glass Fiber

Condenser: Glass ✓ Other _____

Cleaned according to sampling protocol? Yes

Sorbent Trap: Glass ✓ Other _____

Thermocouple attached to trap? Yes

Cleaned according to sampling protocol? Yes

Covered with foil at all times? Yes

Impinger train: Number of impingers _____

Cleaned according to sampling protocol? 4 + 1 condensate trap

Contents: 1st 100 mls H_2O 2nd 100 mls H_2O 3rd empty

4th S.G. 5th ~~_____~~ 6th ~~_____~~

PROCEDURAL CHECKLIST
FOR ~~SEMI-VOLATILE ORGANIC AND~~ PCDD/PCDF SAMPLING (Continued)

Date 6/10/93 Time 1405 Operator S. DiCarlo Observer PMM

Impinger weights or volumes recorded? Yes
Cooling system ice bath & recirc. pump
Recirculation pump for condenser set-up? Yes
Proper connections? Yes
Modifications None
Silica Gel: Type Coarse New? _____ Used? ✓
Barometer: Mercury _____ Aneroid _____ Other Weather Station
Gas Density Determination: Temperature sensor ✓ elevation corrected
Pressure gauge _____
Temperature sensor properly attached to probe? Yes
Recent Calibrations: Pitot tubes Yes
Meter box Yes Thermocouples/thermometers Yes
Filters checked visually for irregularities? Yes
Filters properly centered? Yes Labeled? Yes
Proper sampling site properly elected? Yes
Nozzle size properly selected? Yes
Proper sampling time selected? Yes
All openings of sampling train plugged (pre-test and post-test) Yes

Test Procedures

Impingers, condenser, and sorbent trap properly assembled? Yes
Cyclone attached (inlet only)? NA
Pitot lines checked for leaks and plugging? Yes
Meter box leveled? Yes Manometers zeroed? Yes
Delta H from most recent calibration 2.012
factor ~~Nomograph~~ setup correctly? Yes K factor 3.09
Pretest leak check conducted? Yes Leakage rate? see data sheets
Care taken to avoid scraping port or stack wall? Yes
Effective seal around probe when in-stack? Yes
Probe moved to traverse points at proper time? Yes
Train leak checked during port changes? Before Yes After Yes
Nozzle and pitot tubes kept parallel to stack at all times? Yes
Filter(s) ~~or thimbles~~ changed during run? Yes
Any particulate lost during filter change? NO

PROCEDURAL CHECKLIST
FOR ~~SEMI-VOLATILE ORGANIC AND~~ PCDD/PCDF SAMPLING (Continued)

Date 6/10/93 Time 1410 Operator S. DiCarlo Observer PMM

Sorbent trap inlet temperature maintained ≤ 68°F? Yes

Data forms completed and data recorded properly? Yes

Calculated K Factor ~~Nomograph~~ setting changed with significant change in the stack temperature? Yes

Velocity pressure and orifice pressure recorded accurately? Yes

Post-test leak check conducted? Yes Leakage rate see data sheets

at inches of mercury

Orsat analysis? — Stack Integrated ✓

Approximate stack temperature 218 Gas sample volume

Percent isokinetic calculated Yes

Sample Recovery

Brushes: Nylon bristle Other Teflon

Wash Bottles: Glass — Teflon® yes Other —

Cleaned according to sampling protocol? yes

Storage containers: Borosilicate glass yes Other

Cleaned according to sampling protocol? yes

Cap material Teflon lined Leak free? yes

Petri dishes: Borosilicate glass Amber bottles Other —

Cleaned according to sampling protocol?

Graduated cylinder: Borosilicate glass yes Other

Subdivisions of graduated cylinder ≤ 2 ml? yes

Cleaned according to sampling protocol? yes

Balance type electronic Calibrated? yes weight vs. volum

Probe allowed to cool sufficiently? yes

Probe and sample train openings covered? yes

Clean-up area(s) used Recovery trailer

Silica gel: Color? blue Condition? good

Filter or Thimble Handling: Tweezers used? yes Surgical Gloves? yes

Any particulate lost? no

Foil wrapped? yes

Probe handling: Methanol/methylene chloride rinses yes DCM/Acetone

Brushed? yes Other rinses

Particulate recovery: Probe nozzle yes Probe fitting N/A

Probe liner yes Front half of filter holder yes

PROCEDURAL CHECKLIST
FOR ~~SEMI-VOLATILE ORGANIC AND~~ PCDD/PCDF SAMPLING (Continued)

Date 6/10/93 Time 1600 Operator DeYarbo Observer Meeks/O'Neill

Condenser and filter back half handling:
Methylene chloride/methanol rinses ~~yes~~ NO Other rinses DCM/Acetone
Sorbent trap handling: Capped? yes Stored in cooler? yes
Foil wrapped? yes
Impinger handling: Weighed? yes Distilled water rinses? yes
Methylene Chloride/Methanol Rinses ~~yes~~ NO Other Rinses DCM/Acetone
Methylene Chloride/Acetone Rinses yes
QA/QC Toluene Rinse Performed (Method 23 Only) ~~NO~~ yes

Blanks collected: Reagent(s) yes
XAD yes Methanol _____ Methylene Chloride yes
Acetone yes Toluene yes

Recovery efficiency samples collected from this train? Tol QA/QC sample collected
Sample numbers: _____

Samples labeled and stored properly? yes

Liquid levels marked? yes

NOTE: This TSA can also be applied to EPA Method 23 sampling and recovery.

PROCEDURAL CHECKLIST
FOR PARTICULATE SAMPLING

Date 6/10/93 Time 0930 Operator A. McCollum Observer PMM

Equipment Setup

Equipment identity matches pretest calibration list? Yes
Probe nozzle: Stainless Steel _____ Glass ✓
Button-hook ✓ Elbow _____ Size .363
Cleaned according to sampling protocol? Yes
Probe Liner: Borosilicate ✓ Quartz _____ Other _____
Cleaned according to sampling protocol? Yes
Probe heating system: wrap
Checked? ✓ Temperature ~235 Stable? Yes
Pitot Tube: Type S ✓ Other _____
Properly attached to probe (no interference to nozzle)? Yes
Modifications: None
Pitot tube coefficient .84
Differential Pressure Gauge: Inclined manometers ✓
Magnehelics _____ Ranges 0 – 10" _____
Filter Holder: Borosilicate Glass ✓ Other _____
Frit material: Borosilicate Glass _____ Stainless _____
Teflon ✓ Other _____
Gasket Material: Silicone _____ Other Viton w teflon coating
Cleaned according to sampling protocol? Yes
Filter Type(s): Quartz
Impinger train: Number of impingers note: Combined with HCL train – 6
Cleaned according to sampling protocol? Yes
Contents: 1st 50 mls H_2SO_4 2nd 100 H_2SO_4 3rd 100 H_2SO_4
4th 100mls NaOH 5th 100mls NaOH 6th S. G.
Impinger Weights recorded? _____
Silica Gel: Type Coarse New? _____ Used? ✓
Barometer: Mercury _____ Aneroid _____ Other Weather Station
Gas Density Determination: Temperature sensor ✓
Pressure gauge _____
Temperature sensor properly attached to probe? Yes

PROCEDURAL CHECKLIST
FOR PARTICULATE SAMPLING
(Continued)

Date 6/10/93 Time 0935 Operator A. McClure Observer PMM

Test Procedures

Recent Calibrations: Pitot tubes Yes
Meter Box Yes Thermocouples/thermometers Yes
Filters checked visually for irregularities? Yes
Filters properly centered? Yes Labeled? Yes
Nozzle size properly selected? Yes
All openings of sampling train plugged (pre-test and post-test) Yes
Impingers properly assembled? Yes
Pitot lines checked for leaks and plugging? Yes
Meter box leveled? Yes Manometers zeroed? Yes
Delta H from most recent calibration 1.942
Nomograph setup correctly? Calculator K factor ~3.25
Pretest leak check conducted? Yes Leakage rate? see data sheets
Care taken to avoid scraping port or stack wall? Yes
Effective seal around probe when in-stack? Yes
Probe moved to traverse points at proper time? Yes
Leak check conducted during port change? Before Yes After? Yes
Nozzle and pitot tubes kept parallel to stack at all times? Yes
Filter(s) changed during run? NO
Any particulate lost during filter change? NA
Data forms completed and data recorded properly? Yes
Calculator factor ~~Nomograph~~ setting changed with significant change in the stack temperature? Yes
Velocity pressure and orifice pressure recorded accurately? Yes
Post-test leak check conducted? Yes Leakage rate see data sheets
at inches of mercury see data sheets
Orsat analysis? Yes Stack _____ Integrated ✓
Approximate stack temperature ~184 Gas sample volume see data sheets
Percent isokinetic calculated Yes

PROCEDURAL CHECKLIST
FOR PARTICULATE SAMPLING
(Continued)

Date 6/10/93 Time 1145 Operator McAdle Observer O'Neill/Meeter

Sample Recovery

Brushes: Nylon bristle yes Other _____
Cleaned according to sampling protocol? yes
Wash Bottles: Glass yes Polyethylene _____ Other _____
Cleaned according to sampling protocol? yes
Storage containers: Borosilicate glass yes Other _____
Cleaned according to sampling protocol? yes
Cap material Teflon lined Leak free? _____
Petri dishes: Borosilicate glass _____ Other plastic
Cleaned according to sampling protocol? N/A
Graduated cylinder: Borosilicate glass yes Other _____
Subdivisions of graduated cylinder ≤ 2 ml? yes
Cleaned according to sampling protocol? yes
Balance type electronic Calibrated? weight vs. volume
Probe allowed to cool sufficiently? yes
Probe and sample train openings covered? yes
Clean-up area(s) used Recovery trailer
Silica gel: Color? blue Condition? good
Probe handling: Acetone rinse yes 0.1 N Nitric rinse —
Particulate recovery: Probe nozzle yes Probe fitting N/A
Probe liner yes Front half of filter holder yes
Blanks collected: Reagent(s) 0.1 N HNO3
D. I. Water for HCl Acetone ✓ and filter
Impinger rinses: D. I. Water yes Other rinses _____
Samples labeled and stored properly? yes
Liquid levels marked? yes
Filter handling: tweezers used? yes Surgical gloves? yes
Any particulate lost? NO

PROCEDURAL CHECKLIST
FOR HCl SAMPLING

Date 6/10/93 Time _____ Operator A. McCollum Observer PMM

Equipment Setup

Equipment identify matches pretest calibration list? _____

Probe Nozzle: Glass ✓

Button-hook ✓ Size .363

Cleaned according to sampling protocol? _____

Probe Liner: Borosilicate ✓ quartz _____ other _____

Probe heating system: wrapped

Cleaned according to sampling protocol? Yes

Checked? ✓ Temperature ~235 Stable? Yes

Pitot Tube: Type S ✓ Other _____

Properly attached to probe (no interference to nozzle)? Yes

Modifications: None

Pitot tube coefficient .84

Differential Pressure Gauge: Inclined manometers ✓ 0-10"

Magnehelics _____ Ranges _____ _____ _____

Other _____ Ranges _____ _____ _____

Filter Holder: Borosilicate Glass ✓ Other _____

Frit material: Teflon ✓ Other _____

Gasket Material: Silicone _____ Other Viton (Teflon coated)

Cleaned according to sampling protocol? _____

Filter Type(s): Quartz

Impinger train: Number of impingers Combined with particulate train - 6

Cleaned according to sampling protocol? Yes

Contents: 1st 50mls H_2SO_4 2nd 100mls H_2SO_4 3rd 100mls H_2SO_4

4th 100mls NaOH 5th 100mls NaOH 6th S. G.

Impinger Weights recorded? _____

Cooling System ice bath

Proper connections? Yes

Modifications None

Silica Gel: Type Coarse New? _____ Used? ✓

Barometer: Mercury _____ Aneroid _____ Other Weather Station

Gas Density Determination: Temperature sensor ✓

Pressure gauge _____

Temperature sensor properly attached to probe? Yes

PROCEDURAL CHECKLIST
FOR HCl SAMPLING
(Continued)

Date 6/10/93 Time 0945 Operator A. McCollum Observer PMM

Test Procedures

Recent Calibrations: Pitot tubes Yes
Meter Box Yes Thermocouples/thermometers Yes
Filters checked visually for irregularities? Yes
Filters properly centered? Yes Labeled? Yes
Sampling site properly elected? Yes
Nozzle size properly selected? Yes
Proper sampling time selected? Yes
All openings of sampling train plugged (pre-test and post-test) Yes
Impingers properly assembled? Yes
Pitot lines checked for leaks and plugging? Yes
Meter box leveled? Yes Manometers zeroed? Yes
Delta H from most recent calibration 1.942
Nomograph setup correctly? Yes - Calculator K factor ~3.25
Pretest leak check conducted? Yes Leakage rate? see data sheets
Care taken to avoid scraping port or stack wall? Yes
Effective seal around probe when in-stack? Yes
Probe moved to traverse points at proper time? Yes
Nozzle and pitot tubes kept parallel to stack at all times? Yes
Filter(s) changed during run? NO
Any particulate lost during filter change? NA
Data forms completed and data recorded properly? Yes
Calculator K factor ~~Nomograph~~ setting changed with significant change in the stack temperature? Yes
Velocity pressure and orifice pressure recorded accurately? Yes
Post-test leak check conducted? Yes Leakage rate see data sheets
at inches of mercury
Orsat analysis? Yes Stack Integrated ✓
Approximate stack temperature ~189 Gas sample volume see data sheets
Percent isokinetic calculated Yes

PROCEDURAL CHECKLIST
FOR HCl SAMPLING
(Continued)

Date 6/10/93 Time 1145 Operator McCollum Observer O'Neill

Sample Recovery

Brushes: Nylon bristle yes Other _____
Wash Bottles: Glass _____ Polyethylene _____ Other Teflon
Cleaned according to sampling protocol? yes
Storage containers: Borosilicate glass yes Other _____
Cleaned according to sampling protocol? yes
Cap material Teflon lined Leak free? _____
Petri dishes: Borosilicate glass plastic for particulate Other _____
Cleaned according to sampling protocol? N/A
Graduated cylinder: Borosilicate glass yes Other _____
Subdivisions of graduated cylinder ≤ 2 ml? yes
Cleaned according to sampling protocol? yes
Balance type electronic Calibrated? weight vs. volume
Probe allowed to cool sufficiently? yes
Probe and sample train openings covered? yes
Clean-up area(s) used recovery trailer
Impingers recovered separately? Impinger 1,2,3 combined 4,5 combined
Sample label: 1st See Rec. Sheets 2nd _____
3rd _____ 4th _____
5th _____ 6th _____
Silica gel: Color? blue Condition? good
Filter Handling: Tweezers Used? yes Surgical Gloves? yes
Any particulate lost? yes
Probe handling: Distilled water rinse NO
Acetone rinse yes Other rinses NO
Particulate recovery: Probe nozzle yes Surgical gloves? yes
Probe liner yes Front half of filter holder yes
Blanks collected: Reagent(s) 0.1 N H_2SO_4
Distilled water yes Acetone yes and filter
Recovery efficiency samples collected from this train? NO
Sample numbers: See Recovery Process

Samples labeled and stored properly? yes
Liquid levels marked? yes

PROCEDURAL CHECKLIST
FOR HEXAVALENT CHROMIUM SAMPLING

Date 6/10/93 Time 1415 Operator K. Hill Observer PMM

Equipment Setup

Equipment identity matches pretest calibration list? Yes

Probe nozzle: Glass ✓ Teflon _____

Button-hook ✓ Elbow _____ Size .354

Cleaned according to sampling protocol? Yes

Probe Liner: Teflon ✓ _____ other _____

Cleaned according to sampling protocol? ✓

Probe heating system: None

Checked? NA Temperature NA Stable? NA

Pitot Tube: Type S ✓ Other _____

Properly attached to probe (no interference to nozzle)? Yes

Modifications: None

Pitot tube coefficient .84

Differential Pressure Gauge: Inclined manometers ✓ 0-10"

Magnehelics _____ Ranges _____ _____ _____

Impinger train: Number of impingers 5

Cleaned according to sampling protocol? Yes

Contents: 1st 300 KOH 2nd 150 KOH 3rd 75 KOH

4th empty 5th empty 6th S.G.

Impinger Weights recorded? _____

KOH Recirculation System Type peristalic pump

Proper connections? Yes

Modifications None

Silica Gel: Type Coarse New? _____ Used? ✓

Barometer: Mercury _____ Aneroid _____ Other _____

Gas Density Determination: Temperature sensor ✓

Pressure gauge _____

Temperature sensor properly attached to probe? Yes

PROCEDURAL CHECKLIST
FOR HEXAVALENT CHROMIUM SAMPLING

Date 6/10/93 Time _____ Operator K. Hill Observer PMM

Test Procedures

Recent Calibrations: Pitot tubes Yes

Meter Box Yes Thermocouples/thermometers Yes

Nozzle size properly selected? Yes

All openings of sampling train plugged (pre-test and post-test) Yes

Impingers properly assembled? Yes

Pitot lines checked for leaks and plugging? Yes

Meter box leveled? Yes Manometers zeroed? Yes

Delta H from most recent calibration 1.942

~~Nomograph~~ setup correctly? Yes K factor 3.0 (factor)

Pretest leak check conducted? Yes Leakage rate? see data sheets

KOH recirculation pump activated Yes

Care taken to avoid scraping port or stack wall? Yes

Effective seal around probe when in-stack? Yes

Probe moved to traverse points at proper time? Yes

Leak check conducted during port change? Before Yes After? Yes

Nozzle and pitot tubes kept parallel to stack at all times? Yes

Data forms completed and data recorded properly? Yes

~~Nomograph~~ setting changed with significant change in the stack temperature? Yes (calculated factor)

Velocity pressure and orifice pressure recorded accurately? Yes

Post-test leak check conducted? Yes Leakage rate see data sheets

at inches of mercury _____

Orsat analysis? ✓ Stack _____ Integrated ✓

Approximate stack temperature ~184 Gas sample volume _____

Percent isokinetic calculated Yes

PROCEDURAL CHECKLIST
FOR SEMI-VOLATILE ORGANIC SAMPLING

Date 6/10/93 Time 1005 Operator W. Fritz Observer PMM

Equipment Setup

Equipment identify matches pretest calibration list? Yes

Probe Nozzle: Stainless steel _____ Other Glass

Button-hook ✓ Size .355

Cleaned according to sampling protocol? Yes

Probe Liner: Borosilicate ✓ quartz _____ other _____

Probe heating system: wrapped

Cleaned according to sampling protocol? Yes

Checked? ✓ Temperature ~ 245 Stable? Yes

Pitot Tube: Type S ✓ Other _____

Properly attached to probe (no interference to nozzle)? Yes

Modifications: None

Pitot tube coefficient .84

Differential Pressure Gauge: Inclined manometers ✓ 0-10"

Magnehelics _____ Ranges _____ _____ _____

Other _____ Ranges _____ _____ _____

Filter Holder: Borosilicate Glass ✓ Other _____

Frit material: Teflon ✓ Other _____

Gasket Material: Silicone _____ Other Viton (teflon coated)

Cleaned according to sampling protocol? Yes

Filter Type(s): Glass Fiber

Condenser: Glass ✓ Other _____

Cleaned according to sampling protocol? Yes

Sorbent Trap: Glass ✓ Other _____

Thermocouple attached to trap? Yes

Cleaned according to sampling protocol? Yes

Covered with foil at all times? Yes

Impinger train: Number of impingers 4 + Condensate Flask

Cleaned according to sampling protocol? Yes

Contents: 1st 100 mls H_2O 2nd 100 mls H_2O 3rd empty

4th S.G. 5th — 6th —

PROCEDURAL CHECKLIST
FOR SEMI-VOLATILE ORGANIC SAMPLING (Continued)

Date ~~10~~ 6/10/93 Time 1010 Operator W. Fritz Observer PMM

Impinger weights or volumes recorded? Yes
Cooling system ice bath & recirc pump
Recirculation pump for condenser set-up? Yes
Proper connections? Yes
Modifications None
Silica Gel: Type Coarse New? _____ Used? ✓
Barometer: Mercury _____ Aneroid _____ Other Weather Station
Gas Density Determination: Temperature sensor ✓
Pressure gauge _____
Temperature sensor properly attached to probe? Yes
Recent Calibrations: Pitot tubes Yes
Meter box Yes Thermocouples/thermometers Yes
Filters checked visually for irregularities? Yes
Filters properly centered? Yes Labeled? Yes
Proper sampling site properly elected? Yes
Nozzle size properly selected? Yes
Proper sampling time selected? Yes
All openings of sampling train plugged (pre-test and post-test) Yes

Test Procedures

Impingers, condenser, and sorbent trap properly assembled? Yes
Pitot lines checked for leaks and plugging? Yes
Meter box leveled? Yes Manometers zeroed? Yes
Delta H from most recent calibration 2.01
K factor ~~Nomograph~~ setup correctly? Yes K factor ~2.90
Pretest leak check conducted? Yes Leakage rate? see data sheets
Care taken to avoid scraping port or stack wall? Yes
Effective seal around probe when in-stack? Yes
Probe moved to traverse points at proper time? Yes
Train leak checked during port changes? Before Yes After Yes
Nozzle and pitot tubes kept parallel to stack at all times? Yes
Filter(s) changed during run? _____
Any particulate lost during filter change? _____

PROCEDURAL CHECKLIST
FOR SEMI-VOLATILE ORGANIC SAMPLING (Continued)

Date 6/10/93 Time 1010 Operator W. Fritz Observer PMM

Sorbent trap inlet temperature maintained ≤ 68°F? Yes

Data forms completed and data recorded properly? Yes

calculated K Factor ~~Nomograph~~ setting changed with significant change in the stack temperature? Yes

Velocity pressure and orifice pressure recorded accurately? Yes

Post-test leak check conducted? Yes Leakage rate see data sheets

at inches of mercury

Orsat analysis? ✓ Stack Integrated ✓

Approximate stack temperature 184 Gas sample volume

Percent isokinetic calculated Yes

Sample Recovery

Brushes: Nylon bristle Other Teflon

Wash Bottles: Glass Teflon® yes Other

Cleaned according to sampling protocol? yes

Storage containers: Borosilicate glass yes Other

Cleaned according to sampling protocol? yes

Cap material Teflon lined Leak free?

Petri dishes: Borosilicate ~~glass~~ both Other

Cleaned according to sampling protocol? yes

Graduated cylinder: Borosilicate glass yes Other

Subdivisions of graduated cylinder ≤ 2 ml? yes

Cleaned according to sampling protocol? yes

Balance type electronic Calibrated? weight vs. value

Probe allowed to cool sufficiently? yes

Probe and sample train openings covered? yes

Clean-up area(s) used recovery trailer

Silica gel: Color? blue Condition? good

Filter Handling: Tweezers used? yes Surgical Gloves? yes

Any particulate lost? NO

Foil wrapped? yes

Probe handling: Methanol/methylene chloride rinses yes

Brushed? yes Other rinses

Particulate recovery: Probe nozzle yes Probe fitting N/A

Probe liner yes Front half of filter holder yes

PROCEDURAL CHECKLIST
FOR SEMI-VOLATILE ORGANIC SAMPLING (Continued)

Date 6/10/93 Time _____ Operator _____ Observer _____

Condenser and filter back half handling:

Methylene chloride/methanol rinses yes Other rinses yes

Sorbent trap handling: Capped? yes Stored in cooler? yes

Foil wrapped? yes

Impinger handling: Weighed? yes Distilled water rinses? yes

Methylene Chloride/Methanol Rinses yes Other Rinses _____

Methylene Chloride/Acetone Rinses NO

Blanks collected: Reagent(s) _____

XAD yes Methanol yes Methylene Chloride yes

Acetone NO Toluene NO

Recovery efficiency samples collected from this train? NO

Sample numbers: See Recovery Sheet

Samples labeled and stored properly? yes

Liquid levels marked? yes

NOTE: This TSA can also be applied to EPA Method 23 sampling and recovery.

~~PARTICULATE~~/TRACE METALS SAMPLING

Date 6/10/93 Time 1015 Operator R. Barber Observer PMM

Equipment Setup

Equipment identity matches pretest calibration list? Yes
Probe nozzle: Stainless Steel _____ Glass ✓
Button-hook ✓ Elbow _____ Size .375
Cleaned according to sampling protocol? Yes
Probe Liner: Borosilicate ✓ Quartz _____ Other _____
Cleaned according to sampling protocol? Yes
Probe heating system: wrapped
Checked? Yes Temperature ~220 Stable? Yes
Pitot Tube: Type S ✓ Other _____
Properly attached to probe (no interference to nozzle)? Yes
Modifications: None
Pitot tube coefficient .84
Differential Pressure Gauge: Inclined manometers ✓
Magnehelics _____ Ranges 0-10" _____ _____
Cylone (inlet only): Borosilicate Glass NA Other _____
Cleaned according to sampling protocol? NA
Filter Holder: Borosilicate Glass ✓ Other _____
Frit material: Borosilicate Glass _____ Stainless _____
Teflon ✓ Other _____
Gasket Material: Silicone _____ Other Viton (Teflon coated)
Cleaned according to sampling protocol? Yes
Filter Type(s): Quartz
Impinger train: Number of impingers 7
Cleaned according to sampling protocol? Yes
Contents: 1st 50 mls HNO_3/H_2O_2 2nd 100 mls HNO_3/H_2O_2 3rd 100 mls HNO_3/H_2O_2
4th empty 5th 100 mls $KMnO_4$ 6th $KMnO_4$ (100 mls) 7. S.
Impinger Weights recorded? _____
Cooling System ice bath
Proper connections? yes
Modifications None
Silica Gel: Type Coarse New? _____ Used? ✓
Barometer: Mercury _____ Aneroid _____ Other Weather Station
Gas Density Determination: Temperature sensor ✓
Pressure gauge _____
Temperature sensor properly attached to probe? Yes

~~PARTICULATE~~/TRACE METALS SAMPLING

Date 6/10/93 Time 1017 Operator R. Barber Observer PMM

Test Procedures

Recent Calibrations: Pitot tubes Yes
Meter Box Yes Thermocouples/thermometers Yes
Filters checked visually for irregularities? Yes
Filters properly centered? Yes Labeled? Yes
Nozzle size properly selected? Yes
All openings of sampling train plugged (pre-test and post-test) Yes
Impingers properly assembled? Yes
Pitot lines checked for leaks and plugging? Yes
Meter box leveled? Yes Manometers zeroed? Yes
Delta H from most recent calibration 1.902
~~Nomograph~~ setup correctly? Yes K factor ~ 3.56
Pretest leak check conducted? Yes Leakage rate? see data sheets
Care taken to avoid scraping port or stack wall? Yes
Effective seal around probe when in-stack? Yes
Probe moved to traverse points at proper time? Yes
Leak check conducted during port change? Before Yes After? Yes
Nozzle and pitot tubes kept parallel to stack at all times? Yes
Filter(s) changed during run? NO
Any particulate lost during filter change? NA
Data forms completed and data recorded properly? Yes
~~Nomograph~~ setting changed with significant change in the stack temperature? Yes
Velocity pressure and orifice pressure recorded accurately? Yes
Post-test leak check conducted? Yes Leakage rate see data sheets
at inches of mercury
Orsat analysis? ✓ Stack Integrated ✓
Approximate stack temperature ~184 Gas sample volume
Percent isokinetic calculated Yes

Sample Recovery

Brushes: Nylon bristle Other Teflon
Cleaned according to sampling protocol? Yes
Wash Bottles: Glass Yes Polyethylene Other X
Cleaned according to sampling protocol? Yes

PARTICULATE/TRACE METALS SAMPLING

Date _____ Time _____ Operator _____ Observer _____

Storage containers: Borosilicate glass yes Other _____
Cleaned according to sampling protocol? yes
Cap material Teflon lined Leak free? _____
Petri dishes: Borosilicate glass no Teflon for filter Other _____
Cleaned according to sampling protocol? yes
Graduated cylinder: Borosilicate glass yes Other _____
Subdivisions of graduated cylinder ≤ 2 ml? yes
Cleaned according to sampling protocol? yes
Balance type electronic Calibrated? weight vs. volume
Probe allowed to cool sufficiently? yes
Probe and sample train openings covered? yes
Clean-up area(s) used recovery Area
Silica gel: Color? blue Condition? good
Probe handling: Acetone rinse N/A 0.1 N Nitric rinse yes
Particulate recovery: Probe nozzle yes Probe fitting yes
Probe liner yes Front half of filter holder yes
Blanks collected: Reagent(s) $KMnO_4$, HNO_3/H_2O_2, HCl/H_2O
0.1 N Nitric yes Acetone yes
Impinger rinses: 0.1 N Nitric yes Other rinses $KMnO_4$ Imp 5/6
Recovery efficiency samples collected from this train? NO HCl/H_2O
Sample numbers: _____
Samples labeled and stored properly? yes
Liquid levels marked? yes
Filter handling: tweezers used? yes plastic Surgical gloves? yes
Any particulate lost? no

NOTE: The above TSA would also be applied to the EPA Method 12 test train.

WESTON
MANAGERS DESIGNERS CONSULTANTS

NOZZLE CALIBRATION DATA FORM

Date 6/9/93 Calibrated by W Fritz

Nozzle Identification Number	Nozzle Diameter, Inches[1]				
	D_1	D_2	D_3	ΔD,[2]	D_{avg}[3]
SV Glass 355A	.355	.356	.355	.001	.355
MMTL Glass 375A	.375	.375	.375	.000	.375
D/HCL Glass 363A	.364	.363	.363	.001	.363
D/F Glass 355B	.355	.354	.355	.002	.355
D/HCL Glass 363B	.362	.363	.363	.001	.363
MMTL Glass 375B	.374	.375	.375	.001	.375
SV Glass 355C	.355	.355	.355	.000	.355
D/F Glass 355D	.354	.356	.355	.002	.355
CRT Glass 355A	.354	.354	.353	.001	.354

Box
SV = 15
D/F = 12
Mnl = 9

Where:

[1] $D_{1,2,3}$ = Three different nozzle diameters, inches; each diameter must be measured to nearest 0.001 in.

[2] ΔD = Maximum difference between any two diameters, inches. ΔD must be $\leq$0.004 in.

[3] D_{avg} = Nozzle diameter = average of D_1, D_2, and D_3.

nozzle.frm

PITOT TUBE IDENTIFICATION NUMBER: P - 52

TYPE S PITOT TUBE INSPECTION DATA FORM

PITOT TUBE ASSEMBLY LEVEL? ✓ (YES) _____ (NO)

PITOT TUBE OPENINGS DAMAGED? _____ (YES-EXPLAIN BELOW) ✓ (NO)

α_1 = 1° (<10°) α_2 = 1° (<10°)

β_1 = 2° (< 5°) β_2 = 1° (< 5°)

γ = 0° θ = 0° A = .90 cm (in.)

z = A sinγ = _____ cm (in.); <0.32 cm (<1/8 in.),

w = A sinθ = _____ cm (in.); <0.32 cm (<1/8 in.),

P_a .45 cm (in.) P_b .45 cm (in.)

D_t .38 cm (in.)

COMMENTS _____

CALIBRATION REQUIRED? _____ (YES) ✓ (NO)

INSPECTOR Walter Peters DATE 2/12/93

PITOT TUBE IDENTIFICATION NUMBER: P - 53

TYPE S PITOT TUBE INSPECTION DATA FORM

PITOT TUBE ASSEMBLY LEVEL? ✓ (YES) _____ (NO)

PITOT TUBE OPENINGS DAMAGED? _____ (YES-EXPLAIN BELOW) ✓ (NO)

α_1 = 0 ° (<10°) α_2 = 2 ° (<10°)

β_1 = 1 ° (< 5°) β_2 = 0 ° (< 5°)

γ = 3 ° θ = 1 ° A = .92 cm (in.)

z = A sin γ = .048 cm (In.); <0.32 cm (<1/8 In.),

w = A sin θ = .016 cm (In.); <0.32 cm (<1/8 In.),

P_a .46 cm (in.) P_b .46 cm (in.)

D_t .38 cm (in.)

COMMENTS _____

CALIBRATION REQUIRED? _____ (YES) ✓ (NO)

INSPECTOR Walter Peters DATE 2/5/93

PITOT TUBE IDENTIFICATION NUMBER: P - 64

TYPE S PITOT TUBE INSPECTION DATA FORM

PITOT TUBE ASSEMBLY LEVEL? ✓ (YES) _____ (NO)

PITOT TUBE OPENINGS DAMAGED? _____ (YES-EXPLAIN BELOW) ✓ (NO)

α_1 = 1 ° (<10°) α_2 = 0 ° (<10°)

β_1 = 1 ° (< 5°) β_2 = 1 ° (< 5°)

γ = 1 ° θ = 0 ° A = .92 cm (in.)

z = A sinγ = .016 cm (in.); <0.32 cm (<1/8 in.),

w = A sinθ = 0 cm (in.); <0.32 cm (<1/8 in.),

P_a .46 cm (in.) P_b .46 cm (in.)

D_t .38 cm (in.)

COMMENTS _____

CALIBRATION REQUIRED? _____ (YES) ✓ (NO)

INSPECTOR Walter Peters DATE 2/8/93

PITOT TUBE IDENTIFICATION NUMBER: P - 70

TYPE S PITOT TUBE INSPECTION DATA FORM

PITOT TUBE ASSEMBLY LEVEL? ✓ (YES) _____ (NO)

PITOT TUBE OPENINGS DAMAGED? _____ (YES-EXPLAIN BELOW) ✓ (NO)

α_1 = 0 ° (<10°) α_2 = 0 ° (<10°)

β_1 = 2 ° (< 5°) β_2 = 0 ° (< 5°)

γ = 1 ° θ = 0 ° A = .94 cm (in.)

z = A sinγ = .016 cm (in.); <0.32 cm (<1/8 in.),

w = A sinθ = 0 cm (in.); <0.32 cm (<1/8 in.),

P_a .47 cm (in.) P_b .47 cm (in.)

D_t .38 cm (in.)

COMMENTS _____

CALIBRATION REQUIRED? _____ (YES) ✓ (NO)

INSPECTOR Walter Peters DATE 2/8/93

PITOT TUBE IDENTIFICATION NUMBER: P - 106

TYPE S PITOT TUBE INSPECTION DATA FORM

PITOT TUBE ASSEMBLY LEVEL? ✓ (YES) _____ (NO)

PITOT TUBE OPENINGS DAMAGED? _____ (YES-EXPLAIN BELOW) ✓ (NO)

α_1 = 5 ° (<10°) α_2 = 5 ° (<10°)

β_1 = 0 ° (< 5°) β_2 = 0 ° (< 5°)

γ = 1 ° θ = 5 ° A = .92 cm (in.)

z = A sin γ = .080 cm (in.); <0.32 cm (<1/8 in.),

w = A sin θ = .016 cm (in.); <0.32 cm (<1/8 in.),

P_a .46 cm (in.) P_b .46 cm (in.)

D_t 3.8 cm (in.)

COMMENTS _____

CALIBRATION REQUIRED? _____ (YES) ✓ (NO)

INSPECTOR Walter Peters DATE 2/8/93

WESTON
MANAGERS DESIGNERS/CONSULTANTS

LONG/PRE DRY GAS METER CALIBRATION DATA FORM

Calibrator PM
Date 3/26/93 Meter Box Number 9 Plant Univ. of Minn. (DATA)
Barometric pressure, P_b = 29.73 in. Hg Dry Gas Meter Number 6843913 Comments Replace Press. Hose on Pump + Cal.

Setting	Gas volume		Temperatures						
Orifice manometer	Wet test meter	Dry gas meter	Wet test meter	Dry gas meter					
(Δ H) in. H_2O	(V_w) ft^3	(V_d) ft^3	(t_w) °F	Inlet (td_i) °F	Outlet (td_o) °F	Avg (t_d) °F	Time (θ), min	Y_i	ΔH @$_i$ in. H_2O
0.5	7	329.367 322.245	69	80, 82, 83	79, 80, 81	81	17.8	1.003	1.783
1.0	5	335.502 330.398	69	84, 86, 87	80, 81, 81	83	9.2	1.003	1.860
1.5	10	346.735 336.530	69	88, 90, 91	81, 82, 83	86	15.5	1.002	1.969
2.0	10	358.075 347.811	69	91, 93, 94	83, 83, 84	88	13.5	1.004	1.984
3.0	10	369.342 359.085	69.5	85, 89, 92	81, 82, 83	85.5	10.8	.9970	1.917
							Avg	Y 1.001	Δ H @ 1.902

If there is only one thermometer on the dry gas meter, record the temperature under td_o.

(ΔH) in. H_2O	$\frac{\Delta H}{13.6}$	$Y_i = \frac{V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$	$\Delta H@i = \frac{0.0317 \Delta H}{P_b (t_d + 460)} \left[\frac{(t_w + 460)\theta}{V_w}\right]^2$
0.5	0.0368	$\frac{(7)(29.73)(81+460)}{(7.122)(29.73+.0368)(69+460)}$	$\frac{(.0317)(.5)}{(29.73)(81+460)} \left[\frac{(69+460)(17.8)}{8}\right]^2$
1.0	0.0735	$\frac{(5)(29.73)(83+460)}{(5.104)(29.73+.0735)(69+460)}$	$\frac{(.0317)(1.0)}{(29.73)(83+460)} \left[\frac{(69+460)(9.2)}{5}\right]^2$
1.5	0.110	$\frac{(10)(29.73)(86+460)}{(10.255)(29.73+.110)(69+460)}$	$\frac{(.0317)(1.5)}{(29.73)(86+460)} \left[\frac{(69+460)(15.5)}{10}\right]^2$
2.0	0.147	$\frac{(10)(29.73)(88+460)}{(10.264)(29.73+.147)(69+460)}$	$\frac{(.0317)(2.0)}{(29.73)(88+460)} \left[\frac{(69+460)(13.5)}{10}\right]^2$
3.0	0.221	$\frac{(10)(29.73)(85.5+460)}{(10.257)(29.73+.221)(69.5+460)}$	$\frac{(.0317)(3.0)}{(29.73)(85.5+460)} \left[\frac{(69.5+460)(10.8)}{10}\right]^2$

WESTON

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

DATE 3/26/93
AMBIENT TEMPERATURE 70
CALIBRATION OK, Pwr

POTENTIOMETER NUMBER #2010 9
BAROMETRIC PRESSURE 29.73
REFERENCE: THERMOCOUPLE SIMULATOR
(ACCURACY ± 1°F)

REFERENCE TEMPERATURE °C	REFERENCE TEMPERATURE °F	TEMPERATURE READING FROM THERMOCOUPLE CHANNEL INPUT NUMBER 1	2	3	4	5	AVERAGE TEMPERATURE READING ⊙	TEMPERATURE DIFFERENCE ⊙ (%)
0	32	32	32	32	32	32	32	0° - 0%
100	212	212	212	212	212	212	212	0° - 0%
500	932	932	932	932	932	932	932	0° - 0%
1000	1832	1826	1826	1826	1826	1826	1826	6° - .26%

COMMENTS

⊙ AVERAGE TEMPERATURE READING = MEAN OF THE TEMPERATURE READINGS FOR THE THERMOCOUPLE CHANNELS

⊙ THE CHANNEL READINGS MUST AGREE WITHIN ± 5°F OR 3°C

ACCEPTABLE TEMPERATURE DIFFERNCE ≤ 1.5 = $\left(\frac{(\text{REF TEMP}^{\circ}\text{F} + 460) - (\text{TEST TEMP}^{\circ}\text{F} + 460)}{(\text{REF TEMP}^{\circ}\text{F} + 460)}\right) \times 100$

POTCAL.47

WESTON

Calibrator PM

POSTTEST DRY GAS METER CALIBRATION DATA FORM

Date 6/29/93 Meter box number 9 Plant RMA-SQF

Barometric pressure, P_b = 29.43 in. Hg Dry gas meter number 6843913 Pretest Y 1.001

Setting	Gas Volume		Temperature				Time (θ), min.	Vacuum Setting, in. Hg.	* Y_i	Y_i = $\frac{V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$
Orifice Manometer	Wet test meter	Dry gas meter	Wet test meter	Dry gas meter						
(ΔH) in. H_2O	(V_w) ft^3	(V_d) ft^3	(t_w) °F	Inlet (td_i) °F	Outlet (td_o) °F	Average (t_d) °F				
1.77	10	775.259 765.329	70.5	84,87,87	79,81,81	83	13.9	13	1.026	
1.77	10	785.230 775.254	70.5	84,85,86	84,81,81	83	14.0	13	1.021	
1.77	10	795.211 785.230	70.5	85,84,87	81,81,81	83.5	13.9	13	1.019	
									Y = 1.022	

If there is only one thermometer on the dry gas meter, record the temperature under td_o.

V_w = Gas volume passing through the wet test meter, ft^3.

V_d = Gas volume passing through the dry gas meter, ft^3.

t_w = Temperature of the gas in the wet test meter, °F.

td_i = Temperature of the inlet gas of the dry gas meter, °F.

td_o = Temperature of the outlet gas of the dry gas meter, °F.

t_d = Average temperature of the gas in the dry gas meter, $\frac{td_i + td_o}{2}$.

$\Delta H@_1 = \frac{0.0317 \Delta H}{P_b (t_w + 460)} \left[\frac{(t_w + 460)\theta}{V_w}\right]^2$

ΔH = Pressure differential across orifice, in. H_2O.

Y_i = Ratio of accuracy of wet test meter to dry gas meter for each run.

Y = Average ratio of accuracy of wet test meter to dry gas meter for all three runs; tolerance = pretest Y ± 0.05Y.

P_b = Barometric pressure, in. Hg.

θ = Time of calibration run, min.

Long calibration required? Yes ✓ No _____

WESTON

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

DATE 6/29/93
AMBIENT TEMPERATURE 76
CALIBRATION OK ✓ PM

POTENTIOMETER NUMBER 2010 #9
BAROMETRIC PRESSURE 29.43
REFERENCE: THERMOCOUPLE SIMULATOR
(ACCURACY ± 1°F)

REFERENCE TEMPERATURE °C	REFERENCE TEMPERATURE °F	TEMPERATURE READING FROM THERMOCOUPLE CHANNEL INPUT NUMBER 1	2	3	4	5	AVERAGE TEMPERATURE READING ⊙	TEMPERATURE DIFFERENCE ⊙ (%)
0	32	33	33	33	33	33	33	1° - .20%
100	212	213	213	213	213	213	213	1° - .14%
500	932	932	932	932	932	932	932	0° - 0%
1000	1832	1827	1827	1827	1827	1827	1827	5° - .21%

COMMENTS

⊙ AVERAGE TEMPERATURE READING = MEAN OF THE TEMPERATURE READINGS FOR THE THERMOCOUPLE CHANNELS

⊙ THE CHANNEL READINGS MUST AGREE WITHIN ± 5°F OR 3°C

ACCEPTABLE TEMPERATURE DIFFERNCE ≤ 1.5 = $\left(\frac{(\text{REF TEMP}^{\circ}\text{F} + 460) - (\text{TEST TEMP}^{\circ}\text{F} + 460)}{(\text{REF TEMP}^{\circ}\text{F} + 460)}\right) \times 100$

POTCAL.4T

WESTON

LONG/PRE DRY GAS METER CALIBRATION DATA FORM

Calibrator ACM

Date 6/3/93 Meter Box Number 2010 #12 Plant RMA-5OI

Barometric pressure, P_b = 29.45 in. Hg Dry Gas Meter Number 6898070 Comments

Setting	Gas volume		Temperatures						
Orifice manometer	Wet test meter	Dry gas meter	Wet test meter	Dry gas meter					
(Δ H) in. H_2O	(V_w) ft³	(V_d) ft³	(t_w) °F	Inlet (td_i) °F	Outlet (td_o) °F	Avg (t_d) °F	Time (θ), min	Y_i	ΔH @$_i$ in. H_2O
0.5	5	407.923 404.900	68	79,79,78	76,77,76	77.5	14.0	1.012	2.188
1.0	5	415.948 410.925	67	77,77,78	75,75,75	76.1	9.5	1.010	2.013
1.5	10	427.011 416.950	69.5	80,82,83	77,77,78	79.5	15.3	1.008	1.964
2.0	10	438.047 428.011	69	80,82,83	77,77,77	79.3	13.2	1.010	1.946
3.0	10	449.077 439.049	69.5	83,84,85	78,78,78	81	10.8	1.011	1.951
							Avg	Y 1.010	ΔH @ 2.012

If there is only one thermometer on the dry gas meter, record the temperature under td_o.

(ΔH) in. H_2O	$\frac{\Delta H}{13.6}$	$Y_i = \frac{V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$	$\Delta H@i = \frac{0.0317 \Delta H}{P_b (t_d + 460)} \left[\frac{(t_w + 460)\theta}{V_w}\right]^2$
0.5	0.0368	$\frac{5 \cdot 29.45 (77.5 + 460)}{5.023 (29.45 + 0.0368)(68 + 460)}$	$\frac{0.0317 \cdot 0.5}{29.45 (77.5 + 460)} \left[\frac{(68 + 460) 14.0}{5}\right]^2$
1.0	0.0735	$\frac{5 \cdot 29.45 (76.1 + 460)}{5.023 (29.45 + 0.0735)(67 + 460)}$	$\frac{0.0317 \cdot 1.0}{29.45 (76.1 + 460)} \left[\frac{(67 + 460) 9.5}{5}\right]^2$
1.5	0.110	$\frac{10 \cdot 29.45 (79.5 + 460)}{10.061 (29.45 + 0.110)(69.5 + 460)}$	$\frac{0.0317 \cdot 1.5}{29.45 (79.5 + 460)} \left[\frac{(69.5 + 460) 15.3}{10}\right]^2$
2.0	0.147	$\frac{10 \cdot 29.45 (79.3 + 460)}{10.036 (29.45 + 0.147)(69 + 460)}$	$\frac{0.0317 \cdot 2.0}{29.45 (79.3 + 460)} \left[\frac{(69 + 460) 13.2}{10}\right]^2$
3.0	0.221	$\frac{10 \cdot 29.45 (81 + 460)}{\quad}$	$\frac{0.0317 \cdot 3.0}{\quad} \left[\frac{(69.5 + 460) 10.8}{\quad}\right]^2$

WESTON

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

DATE 6/3/93
AMBIENT TEMPERATURE 68
CALIBRATION OK

POTENTIOMETER NUMBER 12
BAROMETRIC PRESSURE 29.45
REFERENCE: THERMOCOUPLE SIMULATOR
(ACCURACY ± 1°F)

REFERENCE TEMPERATURE °C	REFERENCE TEMPERATURE °F	TEMPERATURE READING FROM THERMOCOUPLE CHANNEL INPUT NUMBER 1	2	3	4	5	AVERAGE TEMPERATURE READING ⊙	TEMPERATURE DIFFERENCE ⊙ (%)
0	32	32	31	32	32	32	31.8	.2° — 0.040%
100	212	212	212	212	212	212	212	0° — 0%
500	932	930	930	930	930	930	930	2° — 0.143%
1000	1832	1827	1825	1825	1825	1827	1825.8	6.2° — 0.27%

COMMENTS

⊙ AVERAGE TEMPERATURE READING = MEAN OF THE TEMPERATURE READINGS FOR THE THERMOCOUPLE CHANNELS

⊙ THE CHANNEL READINGS MUST AGREE WITHIN ± 5° F OR 3 °C

ACCEPTABLE TEMPERATURE DIFFERNCE ≤ 1.5 = $\left(\frac{(\text{REF TEMP}^{\circ}\text{F} + 460) - (\text{TEST TEMP}^{\circ}\text{F} + 460)}{(\text{REF TEMP}^{\circ}\text{F} + 460)}\right) \times 100$

POTCAL.47

WESTON

Calibrator PM

POSTTEST DRY GAS METER CALIBRATION DATA FORM

Date 6/30/93 Meter box number 12 Plant RMA-SQI

Barometric pressure, P_b = 29.50 in. Hg Dry gas meter number 6898070 Pretest Y 1.010

Setting	Gas Volume		Temperature				Time (θ), min.	Vacuum Setting, in. Hg.		Y_i = $\frac{V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$
Orifice Manometer	Wet test meter	Dry gas meter	Wet test meter	Dry gas meter						
(ΔH) in. H_2O	(V_w) ft^3	(V_d) ft^3	(t_w) °F	Inlet (td_i) °F	Outlet (td_o) °F	Average (t_d) °F			Y_i	
1.44	10	1000.024 989.851	~~70.208~~ ~~0.024~~ Pm 71.5	79,79,79	78,77,77	78	15.5	11.5	.9914	
1.44	10	10.208 0.024	71	78,79,80	79,79,79	77.5	15.6	11.5	.9903	
1.44	10	20.415 10.207	71	79,80,80	76,76,76	78	15.6	11.5	.9890	
									Y = .9902	

If there is only one thermometer on the dry gas meter, record the temperature under td_o.

V_w = Gas volume passing through the wet test meter, ft^3.
V_d = Gas volume passing through the dry gas meter, ft^3.
t_w = Temperature of the gas in the wet test meter, °F.
td_i = Temperature of the inlet gas of the dry gas meter, °F.
td_o = Temperature of the outlet gas of the dry gas meter, °F.
t_d = Average temperature of the gas in the dry gas meter, $\frac{td_i + td_o}{2}$.
ΔH = Pressure differential across orifice, in. H_2O.
Y_i = Ratio of accuracy of wet test meter to dry gas meter for each run.
Y = Average ratio of accuracy of wet test meter to dry gas meter for all three runs; tolerance = pretest Y ± 0.05Y.
P_b = Barometric pressure, in. Hg.
θ = Time of calibration run, min.

$$\Delta H @_i = \frac{0.0317 \Delta H}{P_b (t_w + 460)} \left[\frac{(t_w + 460)\theta}{V_w}\right]^2$$

Long calibration required? Yes _____ No ✓

WESTON

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

DATE 6/30/93
AMBIENT TEMPERATURE 77
CALIBRATION ok, PM

POTENTIOMETER NUMBER 2010 # 12
BAROMETRIC PRESSURE 29.50
REFERENCE: THERMOCOUPLE SIMULATOR
(ACCURACY ± 1°F)

REFERENCE TEMPERATURE °C	REFERENCE TEMPERATURE °F	TEMPERATURE READING FROM THERMOCOUPLE CHANNEL INPUT NUMBER 1	2	3	4	5	AVERAGE TEMPERATURE READING ⊙	TEMPERATURE DIFFERENCE ⊙ (%)
0	32	32	32	32	32	32	32	0°-0%
100	212	212	212	212	212	212	212	0°-0%
500	932	931	931	931	931	931	931	1°-.07%
1000	1832	1827	1827	1827	1827	1827	1827	5°-.21%

COMMENTS

⊙ AVERAGE TEMPERATURE READING = MEAN OF THE TEMPERATURE READINGS FOR THE THERMOCOUPLE CHANNELS

⊙ THE CHANNEL READINGS MUST AGREE WITHIN ± 5°F OR 3°C

ACCEPTABLE TEMPERATURE DIFFERNCE ≤ 1.5 = $\left(\frac{(\text{REF TEMP}^{\circ}\text{F} + 460) - (\text{TEST TEMP}^{\circ}\text{F} + 460)}{(\text{REF TEMP}^{\circ}\text{F} + 460)}\right) \times 100$

POTCAL.4T

WESTON

LONG/PRE DRY GAS METER CALIBRATION DATA FORM

Calibrator PM

Date 3/25/93 Meter Box Number 15 Plant Univ. of Minn. (WATS)

Barometric pressure, P_b = 29.73 in. Hg Dry Gas Meter Number 1348735 Comments Cal.

Setting	Gas volume		Temperatures						
Orifice manometer	Wet test meter	Dry gas meter	Wet test meter	Dry gas meter					
(Δ H) in. H_2O	(V_w) ft^3	(V_d) ft^3	(t_w) °F	Inlet (td_i) °F	Outlet (td_o) °F	Avg (t_d) °F	Time (θ), min	Y_i	ΔH @$_i$ in. H_2O
0.5	5	675.127 670.024	68	76,78,78	76,76,76	76.5	13.0	.9943	1.872
1.0	5	681.257 676.146	68	79,80,80	77,77,77	78.5	9.4	.9958	1.951
1.5	10	692.520 682.274	68.5	82,84,85	78,78,79	81	15.9	.9953	2.087
2.0	10	703.814 693.546	68.5	86,87,88	79,80,80	83.5	13.8	.9966	2.087
3.0	10	715.141 704.869	68.5	88,90,91	81,81,81	85.5	11.2	.9950	2.054
							Avg	Y .9954	ΔH @ 2.010

If there is only one thermometer on the dry gas meter, record the temperature under td_o.

(ΔH) in. H_2O	$\frac{\Delta H}{13.6}$	$Y_i = \frac{V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$	$\Delta H@i = \frac{0.0317 \Delta H}{P_b (t_d + 460)} \left[\frac{(t_w + 460)\theta}{V_w}\right]^2$
0.5	0.0368	$\frac{(5)(29.73)(76.5+460)}{(5.103)(29.73+.0368)(68+460)}$	$\frac{(.0317)(.5)}{(29.73)(76.5+460)}\left[\frac{(68+460)(13.0)}{5}\right]^2$
1.0	0.0735	$\frac{(5)(29.73)(78.5+460)}{(5.108)(29.73+.0735)(68+460)}$	$\frac{(.0317)(1.0)}{(29.73)(78.5+460)}\left[\frac{(68+460)(9.4)}{5}\right]^2$
1.5	0.110	$\frac{(10)(29.73)(81+460)}{(10.246)(29.73+.110)(68.5+460)}$	$\frac{(.0317)(1.5)}{(29.73)(81+460)}\left[\frac{(68.5+460)(15.9)}{10}\right]^2$
2.0	0.147	$\frac{(10)(29.73)(83.5+460)}{(10.268)(29.73+.147)(68.5+460)}$	$\frac{(.0317)(2.0)}{(29.73)(83.5+460)}\left[\frac{(68.5+460)(13.8)}{10}\right]^2$
3.0	0.221	$\frac{(10)(29.73)(85.5+460)}{(10.297)(29.73+.221)(68.5+460)}$	$\frac{(.0317)(3.0)}{(29.73)(85.5+460)}\left[\frac{(68.5+460)(11.2)}{10}\right]^2$

WESTON

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

DATE 3/25/93
AMBIENT TEMPERATURE 67
CALIBRATION ok, pm

POTENTIOMETER NUMBER 2010 4 15
BAROMETRIC PRESSURE 29.73
REFERENCE: THERMOCOUPLE SIMULATOR
(ACCURACY ± 1°F)

REFERENCE TEMPERATURE °C	REFERENCE TEMPERATURE °F	TEMPERATURE READING FROM THERMOCOUPLE CHANNEL INPUT NUMBER 1	2	3	4	5	AVERAGE TEMPERATURE READING ⊙	TEMPERATURE DIFFERENCE ⊙ (%)
0	32	34	35	35	34	34	34.4	2.4 - 1.8%
100	212	214	215	215	214	214	214.4	2.4 - 1.35%
500	932	931	932	932	931	931	931.4	.6 - .04%
1000	1832	1827	1828	1828	1827	1827	1827.4	4.6 - .20%

COMMENTS

⊙ AVERAGE TEMPERATURE READING = MEAN OF THE TEMPERATURE READINGS FOR THE THERMOCOUPLE CHANNELS

⊙ THE CHANNEL READINGS MUST AGREE WITHIN ± 5°F OR 3°C

ACCEPTABLE TEMPERATURE DIFFERNCE ≤ 1.5 = $\left(\frac{(\text{REF TEMP}^{\circ}\text{F} + 460) - (\text{TEST TEMP}^{\circ}\text{F} + 460)}{(\text{REF TEMP}^{\circ}\text{F} + 460)}\right) \times 100$

POTCAL.4T

Calibrator PM

POSTTEST DRY GAS METER CALIBRATION DATA FORM

Date 4/18/97 Meter box number 15 Plant RMA-3QI

Barometric pressure, P_b = 29.73 in. Hg Dry gas meter number 1348735 Pretest Y .9928

Setting	Gas Volume		Temperature				Time (θ), min.	Vacuum Setting, in. Hg.	Y_i	$Y_i =$ $\frac{V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$
			Wet test meter	Dry gas meter						
Orifice Manometer (ΔH) in. H_2O	Wet test meter (V_w) ft^3	Dry gas meter (V_d) ft^3	Wet test meter (t_w) °F	Inlet (td_i) °F	Outlet (td_o) °F	Average (t_d) °F				
1.4	10	757.325 747.281	73	84,84,85	79,79,80	82	16.1	13	1.008	
1.4	10	767.417 757.325	73	84,84,85	80,80,80	82	16.2	13	1.004	
1.4	10	777.551 767.417	73	86,86,87	80,81,81	83.5	16.2	13	1.002	
									Y = 1.004	

If there is only one thermometer on the dry gas meter, record the temperature under td_o.

V_w = Gas volume passing through the wet test meter, ft^3.
V_d = Gas volume passing through the dry gas meter, ft^3.
t_w = Temperature of the gas in the wet test meter, °F.
td_i = Temperature of the inlet gas of the dry gas meter, °F.
td_o = Temperature of the outlet gas of the dry gas meter, °F.
t_d = Average temperature of the gas in the dry gas meter, $\frac{td_i + td_o}{2}$.
$\Delta H@_1 = \frac{0.0317 \Delta H}{P_b (t_d + 460)} \left[\frac{(t_w + 460)\theta}{V_w}\right]^2$
ΔH = Pressure differential across orifice, in. H_2O.
Y_i = Ratio of accuracy of wet test meter to dry gas meter for each run.
Y = Average ratio of accuracy of wet test meter to dry gas meter for all three runs; tolerance = pretest Y ± 0.05Y.
P_b = Barometric pressure, in. Hg.
θ = Time of calibration run, min.

Long calibration required? Yes _____ No ✓

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

DATE 6/18/93
AMBIENT TEMPERATURE 72
CALIBRATION ok - jbn

POTENTIOMETER NUMBER 20104/5
BAROMETRIC PRESSURE 29.73
REFERENCE: THERMOCOUPLE SIMULATOR
(ACCURACY ± 1°F)

REFERENCE TEMPERATURE °C	REFERENCE TEMPERATURE °F	TEMPERATURE READING FROM THERMOCOUPLE CHANNEL INPUT NUMBER 1	2	3	4	5	AVERAGE TEMPERATURE READING ⊙	TEMPERATURE DIFFERENCE ⊙ (%)
0	32	32	33	33	32	32	32.4	.4° - .08%
100	212	213	214	214	213	213	213.4	1.4° - .20%
500	932	930	930	930	930	930	930	2° - .14%
1000	1832	1824	1825	1825	1824	1824	1824.4	7.6° - .55%

COMMENTS

⊙ AVERAGE TEMPERATURE READING = MEAN OF THE TEMPERATURE READINGS FOR THE THERMOCOUPLE CHANNELS

⊙ THE CHANNEL READINGS MUST AGREE WITHIN ± 5°F OR 3°C

ACCEPTABLE TEMPERATURE DIFFERNCE ≤ 1.5 = $\left(\frac{(\text{REF TEMP}^{\circ}\text{F} + 460) - (\text{TEST TEMP}^{\circ}\text{F} + 460)}{(\text{REF TEMP}^{\circ}\text{F} + 460)}\right) \times 100$

POTCAL.4T

WESTON

LONG/PRE DRY GAS METER CALIBRATION DATA FORM

Calibrator PM
Date 4/09/93 Meter Box Number 16 Plant Rachel Leathock
Barometric pressure, P_b = 29.52 in. Hg Dry Gas Meter Number 1348727 Comments

Setting	Gas volume		Temperatures							
Orifice manometer	Wet test meter	Dry gas meter	Wet test meter	Dry gas meter						
(Δ H) in. H_2O	(V_w) ft³	(V_d) ft³	(t_w) °F	Inlet (td_i) °F	Outlet (td_o) °F	Avg (t_d) °F	Time (θ), min	Y_i	$\Delta H @_i$ in. H_2O
0.5	5	143.029 / 137.940	70	78,78,79	74,75,76	76.5	12.7	.9933	1.813
1.0	5	147.240 / 142.140	70	79,81,81	76,76,76	78	9.2	.9927	1.898
1.5	10	160.440 / 150.181	70	82,83,85	77,78,79	80.5	15.3	.9903	1.959
2.0	10	171.992 / 161.855	70	85,87,87	79,80,80	82.5	13.5	.9949	2.028
3.0	10	183.034 / 172.740	70	87,88,89	79,80,80	84	16.0	.9906	2.012
							Avg	Y .9923	$\Delta H @$ 1.942

If there is only one thermometer on the dry gas meter, record the temperature under td_o.

(ΔH) in. H_2O	$\frac{\Delta H}{13.6}$	$Y_i = \frac{V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$	$\Delta H@i = \frac{0.0317 \Delta H}{P_b (t_d + 460)} \left[\frac{(t_w + 460)\theta}{V_w}\right]^2$
0.5	0.0368	$\frac{(5)(29.52)(76.5+460)}{(5.089)(29.52+.0368)(70+460)}$	$\frac{(.0317)(.5)}{(29.52)(76.5+460)} \left[\frac{(70+460)(12.7)}{5}\right]^2$
1.0	0.0735	$\frac{(5)(29.52)(78+460)}{(5.100)(29.52+.0735)(70+460)}$	$\frac{(.0317)(1.0)}{(29.52)(78+460)} \left[\frac{(70+460)(9.2)}{5}\right]^2$
1.5	0.110	$\frac{(10)(29.52+460)(80.5+460)}{(10.259)(29.52+.110)(70+460)}$	$\frac{(.0317)(1.5)}{(29.52)(80.5+460)} \left[\frac{(70+460)(15.3)}{10}\right]^2$
2.0	0.147	$\frac{(10)(29.52)(82+460)}{(10.237)(29.52+.147)(70+460)}$	$\frac{(.0317)(2)}{(29.52)(82+460)} \left[\frac{(70+460)(13.5)}{10}\right]^2$
3.0	0.221	$\frac{(10)(29.52)(84+460)}{(10.284)(29.52+.221)(70+460)}$	$\frac{(.0317)(3.0)}{(29.52)(84+460)} \left[\frac{(70+460)(16.0)}{10}\right]^2$

WESTON

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

DATE 4/09/93
AMBIENT TEMPERATURE 65
CALIBRATION Ok. PM

POTENTIOMETER NUMBER 2010 #16
BAROMETRIC PRESSURE 29.53
REFERENCE: THERMOCOUPLE SIMULATOR
(ACCURACY ± 1°F)

REFERENCE TEMPERATURE °C	REFERENCE TEMPERATURE °F	TEMPERATURE READING FROM THERMOCOUPLE CHANNEL INPUT NUMBER 1	2	3	4	5	AVERAGE TEMPERATURE READING ⊙	TEMPERATURE DIFFERENCE ⊙ (%)
0	32	32	34	32	32	32	32.4	.4 - .08%
100	212	212	214	213	212	212	212.6	.6 - .08%
500	932	931	933	932	932	931	931.8	.2 - .01%
1000	1832	1828	1830	1829	1829	1829	1829	3 - .13%

COMMENTS

⊙ AVERAGE TEMPERATURE READING = MEAN OF THE TEMPERATURE READINGS FOR THE THERMOCOUPLE CHANNELS

⊙ THE CHANNEL READINGS MUST AGREE WITHIN ± 5°F OR 3°C

ACCEPTABLE TEMPERATURE DIFFERNCE ≤ 1.5 = $\left(\frac{(\text{REF TEMP}^{\circ}\text{F} + 460) - (\text{TEST TEMP}^{\circ}\text{F} + 460)}{(\text{REF TEMP}^{\circ}\text{F} + 460)}\right) \times 100$

POTCAL-4T

Calibrator PM

POSTTEST DRY GAS METER CALIBRATION DATA FORM

Date 6/16/93 Meter box number 16 Plant RMA - SQE

Barometric pressure, P_b = 29.65 in. Hg Dry gas meter number 348727 Pretest Y .995

Setting	Gas Volume		Temperature				Time (θ), min.	Vacuum Setting, in. Hg.	Y_i	$Y_i =$
Orifice Manometer	Wet test meter	Dry gas meter	Wet test meter	Dry gas meter						
(ΔH) in. H_2O	(V_w) ft^3	(V_d) ft^3	(t_w) °F	Inlet (td_i) °F	Outlet (td_o) °F	Average (t_d) °F				$\frac{V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$
1.6	10	956.024 945.981	71.5	84,84,87	74,76,78	80	15.0	9	1.007	
1.6	10	946.095 936.024	71	84,84,85	76,77,77	80.5	15.0	9	1.006	
1.6	10	974.237 964.095	71.5	85,86,87	78,78,77	82	15.0	9	1.001	
									Y = 1.004	

If there is only one thermometer on the dry gas meter, record the temperature under td_o.

V_w = Gas volume passing through the wet test meter, ft^3.
V_d = Gas volume passing through the dry gas meter, ft^3.
t_w = Temperature of the gas in the wet test meter, °F.
td_i = Temperature of the inlet gas of the dry gas meter, °F.
td_o = Temperature of the outlet gas of the dry gas meter, °F.
t_d = Average temperature of the gas in the dry gas meter, $\frac{td_i + td_o}{2}$. $\Delta H@_1 = \frac{0.0317 \Delta H}{P_b(t_d + 460)} \left[\frac{(t_w + 460)\theta}{V_w}\right]^2$
ΔH = Pressure differential across orifice, in. H_2O.
Y_i = Ratio of accuracy of wet test meter to dry gas meter for each run.
Y = Average ratio of accuracy of wet test meter to dry gas meter for all three runs; tolerance = pretest Y ± 0.05Y.
P_b = Barometric pressure, in. Hg.
θ = Time of calibration run, min.

Long calibration required? Yes _____ No ✓

WESTON

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

DATE 6/16/93
AMBIENT TEMPERATURE 72
CALIBRATION OK. / PM

POTENTIOMETER NUMBER 2010 #16
BAROMETRIC PRESSURE 29.65
REFERENCE: THERMOCOUPLE SIMULATOR
(ACCURACY ± 1°F)

REFERENCE TEMPERATURE °C	REFERENCE TEMPERATURE °F	TEMPERATURE READING FROM THERMOCOUPLE CHANNEL INPUT NUMBER 1	2	3	4	5	AVERAGE TEMPERATURE READING ⊙	TEMPERATURE DIFFERENCE ⊙ (%)
0	32	32	33	32	32	32	32.2	.2 - .04%
100	212	212	214	213	212	212	212.6	.6 - .08%
500	932	932	933	932	932	932	932.2	.2 - .01%
1000	1832	1830	1830	1830	1830	1830	1830	2 - .08%

COMMENTS

⊙ AVERAGE TEMPERATURE READING = MEAN OF THE TEMPERATURE READINGS FOR THE THERMOCOUPLE CHANNELS

⊙ THE CHANNEL READINGS MUST AGREE WITHIN ± 5°F OR 3°C

ACCEPTABLE TEMPERATURE DIFFERNCE ≤ 1.5 = $\left(\frac{(\text{REF TEMP}^{\circ}\text{F} + 460) - (\text{TEST TEMP}^{\circ}\text{F} + 460)}{(\text{REF TEMP}^{\circ}\text{F} + 460)}\right) \times 100$

POTCAL.41

WESTON

Calibrator FM

LONG/PRE DRY GAS METER CALIBRATION DATA FORM (VOST)

Date 8/13/92 Meter box number 4 Plant Broyhill EPA

Barometric pressure, P_b = 29.67 in. Hg Dry gas meter number D506989 Comments _____

Setting			Gas Volume		Temperature							Y_i =
		Orifice Manometer	Wet test meter	Dry gas meter	Wet test meter	Dry gas meter						
Liters per minute	Rotometer	(Δ H) in. H_2O	(V_w) liters	(V_d) liters	(t_w) °F	Inlet (td_i) °C	Outlet (td_o) °C	Average (t_d) °C/°F	Time (θ), min.	Vacuum Setting in. Hg.	Y_i	$\frac{V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$
.5	37	1.1	5	79.96 74.87	74.5	27, 27,27	—	27/80.5	9.7	3	.9921	
.5	37	1.1	5	86.48 80.88	73.5	27, 27,28	—	27.3/81	11.3	3	.9947	
1.0	87	1.45	10	36.17 26.09	73.5	26, 26,26	—	26/79	8.5	3	.9987	
1.0	87	1.45	10	51.17 41.11	72.5	26, 25,25	—	25.3/77.5	8.5	3	.9997	
											Y = .9965	

If there is only one thermometer on the dry gas meter, record the temperature under td_o.

V_w = Gas volume passing through the wet test meter, liters.

V_d = Gas volume passing through the dry gas meter, liters.

t_w = Temperature of the gas in the wet test meter, °F.

td_i = Temperature of the inlet gas of the dry gas meter, °C.

td_o = Temperature of the outlet gas of the dry gas meter, °C.

t_d = Average temperature of the gas in the dry gas meter, $\frac{td_i + td_o}{2}$.

ΔH = Pressure differential across orifice, in. H_2O.

Y_i = Ratio of accuracy of wet test meter to dry gas meter for each run.

Y = Average ratio of accuracy of wet test meter to dry gas meter for all four runs; tolerance = pretest Y ± 0.05Y.

P_b = Barometric pressure, in. Hg.

θ = Time of calibration run, min.

°C (°C)(9/5) + 32 = °F

WESTON

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

DATE 8/13/92
AMBIENT TEMPERATURE 71
CALIBRATION O/C / Pm

POTENTIOMETER NUMBER Vost #4
BAROMETRIC PRESSURE 29.67
REFERENCE: THERMOCOUPLE SIMULATOR (ACCURACY ± 1°F)

REFERENCE TEMPERATURE °C	REFERENCE TEMPERATURE °F	TEMPERATURE READING FROM THERMOCOUPLE CHANNEL INPUT NUMBER 1	2	3	4	5	AVERAGE TEMPERATURE READING ⊙	TEMPERATURE DIFFERENCE ⊙ (%)
0	32	0	0	0	0		0	0° — 0%
100	212	100	100	100	100		100	0° — 0%
500	932	499	499	499	499		499	1° — .07%
1000	1832	997	997	997	997		997	3° — .23%

COMMENTS

⊙ AVERAGE TEMPERATURE READING = MEAN OF THE TEMPERATURE READINGS FOR THE THERMOCOUPLE CHANNELS

⊙ THE CHANNEL READINGS MUST AGREE WITHIN ± 5°F OR 3°C

ACCEPTABLE TEMPERATURE DIFFERNCE ≤ 1.5 = $\left(\frac{(\text{REF TEMP}^{\circ}\text{F} + 460) - (\text{TEST TEMP}^{\circ}\text{F} + 460)}{(\text{REF TEMP}^{\circ}\text{F} + 460)}\right) \times 100$

POTCAL-ST

Calibrator PM

POSTTEST DRY GAS METER CALIBRATION DATA FORM (VOST)

Date 6/21/93 Meter box number 4 Plant RMA-SQT

Barometric pressure, P_b = 29.78 in. Hg Dry gas meter number P506989 Pretest Y ~~1.000~~ .9763

Setting		Gas Volume		Temperature				Time (θ), min.	Vacuum Setting, in. Hg.	Y_i	Y_i = $\frac{V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$
	Orifice Manometer	Wet test meter	Dry gas meter	Wet test meter	Dry gas meter						
Rotometer	(ΔH) in. H_2O	(V_w) liters	(V_d) liters	(t_w) °F	Inlet (td_i) °C	Outlet (td_o) °C	Average (t_d) °C/°F				
	1.5	10	438.19 428.55	74.5	23, 23,23	—	23 / 73.5	8.8	12	1.031	
	1.5	~~10~~ 12	450.76 439.19	74.5	23, 23,23	—	23 / 73.5	10.7	12	1.031	
	1.5	10	460.48 450.76	74.5	23 23,23	—	23 / 73.5	9.0	12	1.023	
										Y = 1.028	

If there is only one thermometer on the dry gas meter, record the temperature under td_o.

V_w = Gas volume passing through the wet test meter, liters.
V_d = Gas volume passing through the dry gas meter, liters.
t_w = Temperature of the gas in the wet test meter, °F.
td_i = Temperature of the inlet gas of the dry gas meter, °C.
td_o = Temperature of the outlet gas of the dry gas meter, °C.
t_d = Average temperature of the gas in the dry gas meter, $\frac{td_i + td_o}{2}$.
ΔH = Pressure differential across orifice, in. H_2O.
Y_i = Ratio of accuracy of wet test meter to dry gas meter for each run.
Y = Average ratio of accuracy of wet test meter to dry gas meter for all three runs; tolerance = pretest Y ± 0.05Y.
P_b = Barometric pressure, in. Hg.
θ = Time of calibration run, min.
°C/°F = (°C 9/5) + 32 = °F

Long calibration required? Yes ✓ No _____

SAMPLE CALCULATIONS FOR HYDROGEN CHLORIDE REMOVAL EFFICIENCY

Client: RMA - SQI
Test Number: Run 1
Test Location: INCINERATOR STACK

Plant: DENVER, COLORADO
Test Date: 06-10-93
Test Period: 0745-1041

1. Percent chlorides in POHC's (Carbon Tetrachloride, Chlorobenzene).

where:

141.83 = Total molecular weight of chlorides contained in carbon tetrachloride

153.84 = Molecular weight of carbon tetrachloride

35.45 = Total molecular weight of chlorides contained in chlorobenzene

112.56 = Molecular weight of chlorobenzene

$$R_1 = \frac{141.83}{153.84} = 0.922 \text{ (or 92.2\% Cl)}$$

$$R_2 = \frac{35.45}{112.56} = 0.315 \text{ (or 31.5\% Cl)}$$

2. Chloride injection rate, lb/hr.

$IR_1 = POHC_{IN1} \times R_1$

$IR_2 = POHC_{IN2} \times R_2$

$IR_1 = 6.90 \times 0.922 = 6.36$

$IR_2 = 8.66 \times 0.315 = 2.73$

where:

$POHC_{IN1}$ = Injection rate of carbon tetrachloride

$POHC_{IN2}$ = Injection rate of chlorobenzene

3. Total input of chlorides based on POHC injection rates, lb/hr.

$$T_{Cl} = IR_1 + IR_2$$

$$T_{Cl} = 6{,}36 + 2.73 = 9.09$$

4. Total Hydrogen Chloride injection rate, lb/hr.

$$T_{HCl} = T_{Cl} \times 1.029$$

$$T_{HCl} = 9.09 \times 1.029 = 9.35$$

where:

1.029 = Conversion factor representing the ratio of the molecular weights of HCl to Cl.

5. Hydrogen Chloride removal efficiency, %.

$$RE = \frac{T_{HCl} - PMR_{HCl}}{T_{HCl}} \times 100$$

$$RE = \frac{9.35 - 0.1273}{9.35} \times 100 = 98.64$$

where:

PMR_{HCl} = Hydrogen Chloride mass emission rate, lb/hr.

SAMPLE CALCULATIONS FOR PARTICULATE ANION TEST (EPA METHOD 5/26A)

Client: RMA - QSI
Test Number: Run 1
Test Location: INCINERATOR STACK

Plant: DENVER, COLORADO
Test Date: 06-10-93
Test Period: 0745-1041

1. Volume of dry gas sampled at standard conditions (68 deg F, 29.92 in. Hg), dscf.

$$Vm(std) = \frac{17.64 \times Y \times Vm \times \left(Pb + \frac{delt\ H}{13.6} \right)}{(Tm + 460)}$$

$$Vm(std) = \frac{17.64 \times 0.9923 \times 87.391 \times \left(24.79 + \frac{1.600}{13.6} \right)}{81.33 + 460} = 70.385$$

Where:

Vm(std)	=	Volume of gas sample measured by the dry gas meter, corrected to standard conditions, dscf.
Vm	=	Volume of gas sample measured by the dry gas meter at meter conditions, dcf.
Pb	=	Barometric Pressure, in Hg.
delt H	=	Average pressure drop across the orifice meter, in H_20.
Tm	=	Average dry gas meter temperature , deg F.
Y	=	Dry gas meter calibration factor.
17.64	=	Factor that includes ratio of standard temperature (528 deg R) to standard pressure (29.92 in. Hg), deg R/in. Hg.
13.6	=	Specific gravity of mercury.

2. Volume of water vapor in the gas sample corrected to standard conditions, scf.

$$Vw(std) = (0.04707 \times Vwc) + (0.04715 \times Wwsg)$$

$$Vw(std) = (0.04707 \times 2545.0) + (0.04715 \times 21.0) = 120.783$$

Where:

Vw(std) = Volume of water vapor in the gas sample corrected to standard conditions, scf.

Vwc = Volume of liquid condensed in impingers, ml.

Wwsg = Weight of water vapor collected in silica gel, g.

0.04707 = Factor which includes the density of water (0.002201 lb/ml), the molecular weight of water (18.0 lb/lb-mole), the ideal gas constant 21.85 (in. Hg) (ft^3)/lb-mole)(deg R); absolute temperature at standard conditions (528 deg R), absolute pressure at standard conditions (29.92 in. Hg), ft^3/ml.

0.04715 = Factor which includes the molecular weight of water (18.0 lb/lb-mole), the ideal gas constant 21.85 (in. Hg) (ft^3)/lb-mole)(deg R); absolute temperature at standard conditions (528 deg R), absolute pressure at standard conditions (29.92 in. Hg), and 453.6 g/lb, ft^3/g.

3. Moisture content

$$Bws = \frac{Vw(std)}{Vw(std) + Vm(std)}$$

$$Bws = \frac{120.783}{120.783 + 70.385} = 0.632$$

Where:

Bws = Proportion of water vapor, by volume, in the gas stream, dimensionless.

4. Mole fraction of dry gas.

Md = 1 - Bws

Md = 1 - 0.632 = 0.368

Where:

Md = Mole fraction of dry gas, dimensionless.

5. Dry molecular weight of gas stream, lb/lb-mole.

$MWd = (0.440 \times \% CO_2) + (0.320 \times \% O_2) + (0.280 \times (\% N_2 + \% CO))$

$MWd = (0.440 \times 10.10) + (0.320 \times 3.40) + (0.280 \times (86.50 + 0.00))$

$= 29.75$

Where:

MWd = Dry molecular weight , lb/lb-mole.

$\% CO_2$ = Percent carbon dioxide by volume, dry basis.

$\% O_2$ = Percent oxygen by volume, dry basis.

$\% N_2$ = Percent nitrogen by volume, dry basis.

% CO = Percent carbon monoxide by volume, dry basis.

0.440 = Molecular weight of carbon dioxide, divided by 100.

0.320 = Molecular weight of oxygen, divided by 100.

0.280 = Molecular weight of nitrogen or carbon monoxide, divided by 100.

6. Actual molecular weight of gas stream (wet basis), lb/lb-mole.

$$MWs = (MWd \times Md) + (18 \times (1 - Md))$$

$$MWs = (29.75 \times 0.368) + 18 (1 - 0.368)) = 22.33$$

Where:

MWs = Molecular weight of wet gas, lb/lb-mole.

18 = Molecular weight of water, lb/lb-mole.

7. Average velocity of gas stream at actual conditions, ft/sec.

$$Vs = 85.49 \times Cp \times ((\text{delt } p)^{1/2})avg \times \left(\frac{Ts\ (avg)}{Ps \times MWs}\right)^{1/2}$$

$$Vs = 85.49 \times 0.84 \times 0.700269 \times \left(\frac{643}{24.78 \times 22.33}\right)^{1/2} = 54.23$$

Where:

Vs = Average gas stream velocity, ft/sec.

85.49 = Pitot tube constant, ft/sec $\times$ $\frac{(lb/lb\text{-}mole)(in.\ Hg)^{1/2}}{(deg\ R)(in\ H2O)}$

Cp = Pitot tube coefficient, dimensionless.

Ts = Absolute gas stream temperature, deg R = Ts, deg F + 460.

Ps = Absolute gas stack pressure, in. Hg. = Pb + $\frac{P(static)}{13.6}$

delt p = Velocity head of stack, in. H_2O.

8. Average gas stream volumetric flowrate at actual conditions, wacf/hr.

$$Qs(act) = 3{,}600 \times Vs \times As$$

$$Qs(act) = 3{,}600 \times 54.23 \times 9.62 = 1878388$$

Where:

Qs(act) = Volumetric flowrate of wet stack gas at actual conditions, wacf/hr.

As = Cross-sectional area of stack, ft^2.

9. Average gas stream dry volumetric flowrate at standard conditions, dscf/hr.

$$Qs(std) = 17.64 \times Md \times \frac{Ps}{Ts} \times Qs(act)$$

$$Qs(std) = 17.64 \times 0.368 \times \frac{24.78}{643} \times 1878388$$

$$= 469812$$

Where:

Qs(std) = Volumetric flowrate of dry stack gas at standard conditions, dscf/hr.

10. Isokinetic variation calculated from intermediate values, percent.

$$I = \frac{17.327 \times Ts \times Vm(std)}{Vs \times O \times Ps \times Md \times (Dn)^2}$$

$$I = \frac{17.327 \times 643 \times 70.385}{54.23 \times 120 \times 24.78 \times 0.368 \times (0.363)^2} = 100.30$$

Where:

I = Percent of isokinetic sampling.

O = Total sampling time, minutes.

Dn = Diameter of nozzle, inches.

17.327 = Factor which includes standard temperature (528 deg R), standard pressure (29.92 in. Hg), the formula for calculating area of circle D^2/4, conversion of square feet to square inches (144), conversion of seconds to minutes (60), and conversion to percent (100),

$$\frac{(\text{in. Hg})(\text{in}^2)(\text{min})}{(\text{deg R})(\text{ft}^2)(\text{sec})}$$

11. Particulate Concentration, gr/dscf.

$$C1 = 15.432 \times \frac{Mt}{Vm(std)}$$

$$C1 = 15.432 \times \frac{0.11150}{70.385}$$

$$= 0.02445$$

Where:

C1 = Particulate concentration, gr/dscf.

Mt = Total weight of particulate caught by train minus the particulate caught by the blank train, gms.

15.432 = Conversion factor from gms to gr.

12. Particulate Concentration, gr/wscf.

$$C2 = C1 \times Md$$

$$C2 = 0.02445 \times 0.368$$

$$= 0.00900$$

Where:

C2 = Particulate concentration, gr/wscf.

13. Particulate Concentration, gr/dscf @ 12% CO_2.

$$C3 = C1 \times \frac{12}{\% CO_2}$$

$$C3 = C1 \times \frac{12}{10.1}$$

$$= 0.02905$$

Where:

C3 = Particulate concentration, gr/dscf @ 12% CO_2.

14. Particulate Concentration, gr/dscf @ 7% O_2.

$$C4 = C1 \times \frac{21 - 7}{21 - \%O_2}$$

$$C4 = C1 \times \frac{21 - 7}{21 - 3.4}$$

$$= 0.01945$$

Where:

C4 = Particulate concentration, gr/dscf @ 7% O_2.

21 = Approximate ambient concentration of Oxygen.

15. Particulate mass emission rate, lbs/hr.

PMRt = 0.008571 x C1 x Qs(std)

PMRt = 0.008571 x 0.02445 x 469812

= 1.6407

Where:

PMRt = Particulate mass emission rate, lbs/hr.

0.008571 = Conversion factor relating grains to pounds (7,000) and minutes to hours.

16. Hydrogen chloride concentration, lbs/dscf.

$$C1(HCl) = \frac{W(HCl) \times 2.2046 \times 10^{-6}}{V_m(std)}$$

$$C1(HCl) = \frac{8.6520 \times 2.2046 \times 10^{-6}}{70.385}$$

C1(HCl) = 1.90E-03

Where:

W(HCl) = Weight of hydrogen chloride collected in sample.

C1(HCl) = Hydrogen chloride concentration, lbs/dscf.

2.2046x10^-6 = Conversion factor from mg to lbs.

17. Hydrogen chloride concentration, ppmv.

$$C2(HCl) = \frac{385.35 \times 10^6}{MW} \times C1(HCl)$$

$$C2(HCl) = \frac{385.35 \times 10^6}{36.45} \times 0.00190$$

= 2.863

Where:

C2(HCl) = Concentration of HCl in stack gas, parts per million by volume (dry basis).

385.35 x 10^6 = Conversion factor from lbs/ppm.

18. Hydrogen chloride mass emission rate, lbs/hr.

PMR(HCl) = C1(HCl) x Qs(std)

PMR(HCl) = 0.00190 x 469812

= 0.1273

Where:

PMR(HCl) = Hydrogen chloride mass emission rate, lbs/hr.

SAMPLE CALCULATIONS FOR VOLATILE ORGANIC COMPOUNDS

Client: RMA
Test Number: Run 1-1
Test Location: SQI STACK

Plant: DENVER, CO
Test Date: 06-10-93
Test Period: 0808-0828

1. Volume of dry gas sampled at standard conditions (68 °F, 29.92 in. Hg), dscf.

$$Vm(std) = \frac{17.64 \times Y \times V_m \times \left(P_b + \frac{\text{delta H}}{13.6}\right) \times 0.035316}{(T_m + 460)}$$

$$Vm(std) = \frac{17.64 \times 0.9963 \times 22.36 \times \left(24.79 + \frac{1.45}{13.6}\right) \times 0.035316}{81.95 + 460} = 0.6376$$

Where:

Vm(std)	=	Volume of gas sample measured by the dry gas meter, corrected to standard conditions, dscf.
V_m	=	Volume of gas sample measured by the dry gas meter at meter conditions, litres.
P_b	=	Barometric Pressure, in Hg.
delta H	=	Average pressure drop across the orifice meter, in H_20.
T_m	=	Average dry gas meter temperature , °F.
Y	=	Dry gas meter calibration factor
17.64	=	Factor that includes ratio of standard temperature (528 °R) to standard pressure (29.92 in. Hg), °R/in. Hg.
13.6	=	Specific gravity of mercury.
0.035316	=	Conversion factor from liters to dcf.

2. Carbon Tetrachloride concentration, lbs/dscf.

$$C_1 = \frac{W \times 2.2046 \times 10^{-12}}{Vm(std)}$$

$$C_1 = \frac{17.5 \times 2.2046 \times 10^{-12}}{0.6376}$$

$$= 6.05E\text{-}11$$

Where:

W = Weight of Carbon Tetrachloride collected in sample in ng.

C_1 = Carbon Tetrachloride concentration, lbs/dscf.

2.2046×10^{-12} = Conversion factor from ng to lbs.

3. Carbon Tetrachloride concentration, ppmv.

$$C_2 = \frac{385.35 \times 10^6}{MW} \times C1$$

$$C_2 = \frac{385.35 \times 10^6}{153.82} \times 6.05E\text{-}11$$

$$= 0.000152$$

Where:

C_2 = Concentration of Carbon Tetrachloride in stack gas, parts per million by volume (dry basis).

385.35×10^6 = Conversion factor from lbs/ppm.

4. Carbon Tetrachloride mass emission rate, lbs/hr.

PMR = C_1 x Qs(std) x 60 min/hr

PMR = 6.05E-11 x 7775 x 60

= 2.82E-05

Where:

PMR = Carbon Tetrachloride mass emission rate, lbs/hr.

Qs(std) = Volumetric flowrate of stack gas at standard conditions, dscf/min.

SAMPLE CALCULATIONS FOR SEMI-VOLATILE ORGANIC COMPOUNDS

Client: RMA - SQI
Test Number: Run 1
Test Location: INCINERATOR STACK

Plant: DENVER, COLORADO
Test Date: 06-10-93
Test Period: 0745-1501

1. Volume of dry gas sampled at standard conditions (68 °F, 29.92 in. Hg), dscf.

$$Vm(std) = \frac{17.64 \times Y \times V_m \times \left(P_b + \frac{\text{delta H}}{13.6}\right)}{(T_m + 460)}$$

$$Vm(std) = \frac{17.64 \times 0.9954 \times 160.728 \times \left(24.79 + \frac{1.35}{13.6}\right)}{75.65 + 460} = 131.135$$

Where:

Vm(std)	=	Volume of gas sample measured by the dry gas meter, corrected to standard conditions, dscf.
V_m	=	Volume of gas sample measured by the dry gas meter at meter conditions, dcf.
P_b	=	Barometric Pressure, in Hg.
delta H	=	Average pressure drop across the orifice meter, in H_20.
T_m	=	Average dry gas meter temperature , °F.
Y	=	Dry gas meter calibration factor
17.64	=	Factor that includes ratio of standard temperature (528 °R) to standard pressure (29.92 in. Hg), °R/in. Hg.
13.6	=	Specific gravity of mercury.

2. Volume of water vapor in the gas sample corrected to standard conditions, scf.

$$Vw(std) = (0.04707 \times Vwc) + (0.04715 \times Wwsg)$$

$$Vw(std) = (0.04707 \times 4655.0) + (0.04715 \times 48.0) = 221.374$$

Where:

Vw(std) = Volume of water vapor in the gas sample corrected to standard conditions, scf.

Vwc = Volume of liquid condensed in impingers, ml.

Wwsg = Weight of water vapor collected in silica gel, g.

0.04707 = Factor which includes the density of water (0.002201 lb/ml), the molecular weight of water (18.0 lb/lb-mole), the ideal gas constant 21.85 (in. Hg) (ft^3)/lb-mole)(°R); absolute temperature at standard conditions (528 °R), absolute pressure at standard conditions (29.92 in. Hg), ft^3/ml.

0.04715 = Factor which includes the molecular weigth of water (18.0 lb/lb-mole), the ideal gas constant 21.85 (in. Hg) (ft^3)/lb-mole)(°R); absolute temperature at standard conditions (528 °R), absolute pressure at standard conditions (29.92 in. Hg), and 453.6 g/lb, ft^3/g.

3. Moisture content

$$Bws = \frac{Vw(std)}{Vw(std) + Vm(std)}$$

$$Bws = \frac{221.374}{221.374 + 131.135} = 0.628$$

Where:

Bws = Proportion of water vapor, by volum, in the gas stream, dimensionless.

4. Mole fraction of dry gas.

Md = 1 - Bws

Md = 1 - 0.628 = 0.372

Where:

Md = Mole fraction of dry gas, dimensionless.

5. Dry molecular weight of gas stream, lb/lb-mole.

$MWd = (0.440 \times \% CO_2) + (0.320 \times \% O_2) + (0.280 \times (\% N_2 + \% CO))$

$MWd = (0.440 \times 10.1) + (0.320 \times 3.4) + (0.280 \times (86.5 + 0.0))$

= 29.75

Where:

MWd = Dry molecular weight , lb/lb-mole.

$\% CO_2$ = Percent carbon dioxide by volume, dry basis.

$\% O_2$ = Percent oxygen by volume, dry basis.

$\% N_2$ = Percent nitrogen by volume, dry basis.

% CO = Percent carbon monoxide by volume, dry basis.

0.440 = Molecular weight of carbon dioxide, divided by 100

0.320 = Molecular weight of oxygen, divided by 100

0.280 = Molecular weight of nitrogen or carbon monoxide, divided by 100.

6. Actual molecular weight of gas stream (wet basis), lb/lb-mole.

$$MWs = (MWd \times Md) + (18 \times (1 - Md))$$

$$MWs = (29.75 \times 0.372) + 18 (1 - 0.372) = 22.37$$

Where:

MWs = Molecular weight of wet gas, lb/lb-mole.

18 = Molecular weight of water, lb/lb-mole.

7. Average velocity of gas stream at actual conditions, ft/sec.

$$V_s = 85.49 \times C_p \times ((\text{delta p})^{\wedge}1/2)\text{avg} \times \left(\frac{Ts\ (avg)}{Ps \times MWs}\right)^{\wedge}1/2$$

$$V_s = 85.49 \times 0.84 \times 0.680311 \times \left(\frac{644}{24.79 \times 22.37}\right)^{\wedge}1/2 = 52.66$$

Where:

V_s = Average gas stream velocity, ft/sec.

85.49 = Pitot tube constant, ft/sec x $\frac{(\text{lb/lb-mole})(\text{in. Hg})^{\wedge}1/2}{(^{\circ}R)(\text{in } H_2O)}$

C_p = Pitot tube coefficient, dimensionless.

T_s = Absolute gas stream temperature, $^{\circ}R = T_s$, $^{\circ}F + 460$.

P_s = Absolute gas stack pressure, in. Hg. $= P_b + \frac{P(static)}{13.6}$

delta p = Velocity head of stack, in. H_2O.

8. Average gas stream volumetric flowrate at actual conditions, wacf/hr.

$$Qs(act) = 3{,}600 \times Vs \times As$$

$$Qs(act) = 3{,}600 \times 52.659 \times 9.6211$$

$$= 1823913$$

Where:

$Qs(act)$ = Volumetric flowrate of wet stack gas at actual conditions, wacf/hr.

A_s = Cross-sectional area of stack, ft^2.

3,600 = Conversion factor from seconds to hours.

9. Average gas stream dry volumtric flowrate at standard conditions, dscf/hr.

$$Qs(std) = 17.64 \times Md \times \frac{P_s}{T_s} \times Qs(act)$$

$$Qs(std) = 17.64 \times 0.372 \times \frac{24.79}{644} \times 1823913$$

$$= 460473$$

Where:

$Qs(std)$ = Volumetric flowrate of dry stack gas at standard conditions, dscf/hr.

10. Percent of Isokinetic sampling.

$$I = \frac{17.327 \times T_s \times Vm(std)}{V_s \times O \times P_s \times Md \times (D_n)^2}$$

$$I = \frac{17.327 \times 644 \times 131.135}{52.66 \times 240 \times 24.79 \times 22.372 \times (0.355)^2} = 99.7$$

Where:

I	=	Percent of isokinetic sampling.
O	=	Total sampling time, minutes.
D_n	=	Diameter of nozzle, inches.
17.327	=	Factor which includes standard temperature (528 °R), standard pressure (29.92 in. Hg), the formula for calculating area of circle D^2/4, conversion of square feet to square inches (144), conversion of seconds to minutes (60), and conversion to percent (100), (in. Hg)(in^2)(min) / (°R)(ft^2)(sec)

11. Diethylphthalate concentration, lbs/dscf.

$$C_1 = \frac{W \times 2.2046 \times 10^{-12}}{Vm(std)}$$

$$C_1 = \frac{9 \times 2.2046 \times 10^{-9}}{131.135}$$

$$= 1.51E\text{-}13$$

Where:

W	=	Weight of Diethylphthalate collected in sample in ug.
C_1	=	Diethylphthalate concentration, lbs/dscf.
2.2046x10^-9	=	Conversion factor from ug to lbs.

12. Diethylphthalate concentration, ppbv.

$$C_2 = \frac{385.35 \times 10^{9}}{MW} \times C_1$$

$$C_2 = \frac{385.35 \times 10^{9}}{222.26} \times 1.51E\text{-}13$$

$$= 2.62E\text{-}04$$

Where:

C_2 = Concentration of Diethylphthalate in stack gas, parts per billion by volume (dry basis).

385.35 x 10^9 = Conversion factor from lbs/ppm.

13. Diethylphthalate mass emission rate, lbs/hr.

PMR = C_1 x Qs(std)

PMR = 1.51E-13 x 460473

= 6.97E-08

Where:

PMR = Diethylphthalate mass emission rate, lbs/hr.

14. Diethylphthalate concentration, ug/dscm.

C_2 = W / (Vm(std) x 0.02832)

C_2 = 9.0 / (131.135 x 0.02832)

= 2.42

Where:

C_2 = Diethylphthalate concentration, ug/dscm.

0.02832 = Conversion factor from cubic feet to cubic meters.

SAMPLE CALCULATIONS FOR DIOXIN/FURAN (EPA METHOD 23)

Client: RMA
Test Number: Run 1
Test Location: SQI STACK

Plant: DENVER, CO
Test Date: 06-10-93
Test Period: 0745-1501

1. Volume of dry gas sampled at standard conditions (68 °F, 29.92 in. Hg), dscf.

$$Vm(std) = \frac{17.64 \times Y \times V_m \times \left(P_b + \frac{\text{delta H}}{13.6}\right)}{(T_m + 460)}$$

$$Vm(std) = \frac{17.64 \times 1.0100 \times 168.721 \times \left(24.79 + \frac{1.42}{13.6}\right)}{77.97 + 460} = 139.100$$

Where:

Vm(std)	=	Volume of gas sample measured by the dry gas meter, corrected to standard conditions, dscf.
V_m	=	Volume of gas sample measured by the dry gas meter at meter conditions, dcf.
P_b	=	Barometric Pressure, in Hg.
delta H	=	Average pressure drop across the orifice meter, in H_20.
T_m	=	Average dry gas meter temperature , °F.
Y	=	Dry gas meter calibration factor
17.64	=	Factor that includes ratio of standard temperature (528 °R) to standard pressure (29.92 in. Hg), °R/in. Hg.
13.6	=	Specific gravity of mercury.

2. Volume of water vapor in the gas sample corrected to standard conditions, scf.

$$Vw(std) = (0.04707 \times Vwc) + (0.04715 \times Wwsg)$$

$$Vw(std) = (0.04707 \times 4851.0) + (0.04715 \times 41.0) = 230.270$$

Where:

Vw(std) = Volume of water vapor in the gas sample corrected to standard conditions, scf.

Vwc = Volume of liquid condensed in impingers, ml.

Wwsg = Weight of water vapor collected in silica gel, g.

0.04707 = Factor which includes the density of water (0.002201 lb/ml), the molecular weight of water (18.0 lb/lb-mole), the ideal gas constant 21.85 (in. Hg) (ft^3)/lb-mole)(°R); absolute temperature at standard conditions (528 °R), absolute pressure at standard conditions (29.92 in. Hg), ft^3/ml.

0.04715 = Factor which includes the molecular weigth of water (18.0 lb/lb-mole), the ideal gas constant 21.85 (in. Hg) (ft^3)/lb-mole)(°R); absolute temperature at standard conditions (528 °R), absolute pressure at standard conditions (29.92 in. Hg), and 453.6 g/lb, ft^3/g.

3. Moisture content

$$Bws = \frac{Vw(std)}{Vw(std) + Vm(std)}$$

$$Bws = \frac{230.270}{230.270 + 139.100} = 0.623$$

Where:

Bws = Proportion of water vapor, by volume, in the gas stream, dimensionless.

4. Mole fraction of dry gas.

Md = 1 - Bws

Md = 1 - 0.623 = 0.377

Where:

Md = Mole fraction of dry gas, dimensionless.

5. Dry molecular weight of gas stream, lb/lb-mole.

$MWd = (0.440 \times \% CO_2) + (0.320 \times \% O_2) + (0.280 \times (\% N_2 + \% CO))$

$MWd = (0.440 \times 10.1) + (0.320 \times 3.4) + (0.280 \times (86.5 + 0.0))$

$= 29.75$

Where:

MWd = Dry molecular weight , lb/lb-mole.

$\% CO_2$ = Percent carbon dioxide by volume, dry basis.

$\% O_2$ = Percent oxygen by volume, dry basis.

$\% N_2$ = Percent nitrogen by volume, dry basis.

% CO = Percent carbon monoxide by volume, dry basis.

0.440 = Molecular weight of carbon dioxide, divided by 100

0.320 = Molecular weight of oxygen, divided by 100

0.280 = Molecular weight of nitrogen and carbon monoxide, divided by 100.

6. Actual molecular weight of gas stream (wet basis), lb/lb-mole.

$$MWs = (MWd \times Md) + (18 \times (1 - Md))$$

$$MWs = (29.75 \times 0.377) + 18 (1 - 0.377) = 22.43$$

Where:

MWs = Molecular weight of wet gas, lb/lb-mole.

18 = Molecular weight of water, lb/lb-mole.

7. Average velocity of gas stream at actual conditions, ft/sec.

$$V_s = 85.49 \times C_p \times ((\text{delta p})^{1/2})\text{avg} \times \left(\frac{Ts\ (avg)}{Ps \times MWs}\right)^{1/2}$$

$$V_s = 85.49 \times 0.84 \times 0.679440 \times \left(\frac{644}{24.79 \times 22.43}\right)^{1/2} = 52.51$$

Where:

V_s = Average gas stream velocity, ft/sec.

85.49 = Pitot tube constant, $\frac{(\text{lb/lb-mole})(\text{in. Hg})^{1/2}}{(^\circ R)(\text{in } H_2O)}$

C_p = Pitot tube coefficient, dimensionless.

T_s = Absolute gas stream temperature, $^\circ R = T_s, ^\circ F + 460$.

P_s = Absolute gas stack pressure, in. Hg. $= P_b + \frac{P(static)}{13.6}$

delta p = Velocity head of stack, in. H_2O.

8. Average gas stream volumetric flowrate at actual conditions, wacf/hr.

$$Qs(act) = 3{,}600 \times V_S \times A_s$$

$$Qs(act) = 3{,}600 \times 52.510 \times 9.6210$$

$$= 1818724$$

Where:

Qs(act) = Volumetric flowrate of wet stack gas at actual conditions, wacf/hr.

A_s = Cross-sectional area of stack, ft^2.

3600 = Conversion factor from seconds to hours.

9. Average gas stream dry volumtric flowrate at standard conditions, dscf/hr.

$$Qs(std) = 17.64 \times Md \times \frac{P_s}{T_s} \times Qs(act)$$

$$Qs(std) = 17.64 \times 0.377 \times \frac{24.79}{644} \times 1818724$$

$$= 465146$$

Where:

Qs(std) = Volumetric flowrate of dry stack gas at standard conditions, dscf/hr.

$$I = \frac{17.327 \times T_s \times Vm(std)}{V_s \times O \times P_s \times Md \times (D_n)^2}$$

$$I = \frac{17.327 \times 644 \times 139.100}{52.51 \times 240 \times 24.79 \times 22.426 \times (0.355)^2} = 104.7$$

Where:

I = Percent of isokinetic sampling.

O = Total sampling time, minutes.

D_n = Diameter of nozzle, inches.

17.327 = Factor which includes standard temperature (528 °R), standard pressure (29.92 in. Hg), the formula for calculating area of circle D^2/4, conversion of square feet to square inches (144), conversion of seconds to minutes (60), and conversion to percent (100),
(in. Hg)(in^2)(min)
(°R)(ft^2)(sec)

11. 2,3,7,8-TCDF concentration, lbs/dscf.

$$C_1 = \frac{W \times 2.2046 \times 10^{-12}}{Vm(std)}$$

$$C_1 = \frac{0.0200 \times 2.2046 \times 10^{-12}}{139.100}$$

$$= 3.17E\text{-}16$$

Where:

W = Weight of 2,3,7,8-TCDF collected in sample in ng.

C_1 = 2,3,7,8-TCDF concentration, lbs/dscf.

2.2046x10^-12 = Conversion factor from ng to lbs.

12. 2,3,7,8-TCDF concentration, ng/dscm.

C_2 = W / (Vm(std) x 0.02832)

C_2 = 0.0200 / (139.100 x 0.02832)

= 0.0051

Where:

C_2 = 2,3,7,8-TCDF concentration, ng/dscm.

0.02832 = Conversion factor from cubic feet to cubic meeters.

13. 2,3,7,8-TCDF mass emission rate, lbs/hr.

PMR = C_1 x Qs(std) x 60 min/hr

PMR = 3.17E-16 x 7752 x 60

= 1.47E-10

Where:

PMR = 2,3,7,8-TCDF mass emission rate, lbs/hr.

SAMPLE CALCULATIONS FOR EPA MULTI-METALS METHOD

Client: RMA - SQI
Test Number: Run 1
Test Location: INCINERATOR STACK

Plant:DENVER,COLORADO
Test Date: 06-10-93
Test Period: 0745-1032

1. Volume of dry gas sampled at standard conditions (68 °F, 29.92 in. Hg), dscf.

$$Vm(std) = \frac{17.64 \times Y \times V_m \times \left(P_b + \frac{\text{delta H}}{13.6}\right)}{(Tm + 460)}$$

$$Vm(std) = \frac{17.64 \times 1.0010 \times 91.757 \times \left(24.79 + \frac{1.75}{13.6}\right)}{78.50 + 460} = 74.974$$

Where:

Vm(std)	=	Volume of gas sample measured by the dry gas meter, corrected to standard conditions, dscf.
V_m	=	Volume of gas sample measured by the dry gas meter at meter conditions, dcf.
P_b	=	Barometric Pressure, in Hg.
delta H	=	Average pressure drop across the orifice meter, in H_20.
T_m	=	Average dry gas meter temperature , °F.
Y	=	Dry gas meter calibration factor
17.64	=	Factor that includes ratio of standard temperature (528 °R) to standard pressure (29.92 in. Hg), °R/in. Hg.
13.6	=	Specific gravity of mercury.

2. Volume of water vapor in the gas sample corrected to standard conditions, scf.

$$Vw(std) = (0.04707 \times Vwc) + (0.04715 \times Wwsg)$$

$$Vw(std) = (0.04707 \times 2712.0) + (0.04715 \times 23.0) = 128.738$$

Where:

Vw(std) = Volume of water vapor in the gas sample corrected to standard conditions, scf.

Vwc = Volume of liquid condensed in impingers, ml.

Wwsg = Weight of water vapor collected in silica gel, g.

0.04707 = Factor which includes the density of water (0.002201 lb/ml), the molecular weight of water (18.0 lb/lb-mole), the ideal gas constant 21.85 (in. Hg) (ft^3)/lb-mole)(°R); absolute temperature at standard conditions (528 °R), absolute pressure at standard conditions (29.92 in. Hg), ft^3/ml.

0.04715 = Factor which includes the molecular weight of water (18.0 lb/lb-mole), the ideal gas constant 21.85 (in. Hg) (ft^3)/lb-mole)(°R); absolute temperature at standard conditions (528 °R), absolute pressure at standard conditions (29.92 in. Hg), and 453.6 g/lb, ft^3/g.

3. Moisture content

$$Bws = \frac{Vw(std)}{Vw(std) + Vm(std)}$$

$$Bws = \frac{128.738}{128.738 + 74.974} = 0.632$$

Where:

Bws = Proportion of water vapor, by volume, in the gas stream, dimensionless.

4. Mole fraction of dry gas.

Md = 1 - Bws

Md = 1 - 0.632 = 0.368

Where:

Md = Mole fraction of dry gas, dimensionless.

5. Dry molecular weight of gas stream, lb/lb-mole.

MWd = (0.440 x % CO2) + (0.320 x % O2) + (0.280 x (% N2 + % CO))

MWd = (0.440 x 10.1) + (0.320 x 3.4) + (0.280 x (86.5 + 0.0))

= 29.75

Where:

MWd = Dry molecular weight , lb/lb-mole.

% CO2 = Percent carbon dioxide by volume, dry basis.

% O2 = Percent oxygen by volume, dry basis.

% N2 = Percent nitrogen by volume, dry basis.

% CO = Percent carbon monoxide by volume, dry basis.

0.440 = Molecular weight of carbon dioxide, divided by 100

0.320 = Molecular weight of oxygen, divided by 100

0.280 = Molecular weight of nitrogen or carbon monoxide, divided by 100.

6. Actual molecular weight of gas stream (wet basis), lb/lb-mole.

$$MWs = (MWd \times Md) + (18 \times (1 - Md))$$

$$MWs = (29.75 \times 0.368) + 18 (1 - 0.368) = 22.33$$

Where:

MWs = Molecular weight of wet gas, lb/lb-mole.

18 = Molecular weight of water, lb/lb-mole.

7. Average velocity of gas stream at actual conditions, ft/sec.

$$V_s = 85.49 \times C_p \times ((\text{delta p})^{\wedge}1/2)\text{avg} \times \left(\frac{T_s\,(\text{avg})}{P_s \times MWs}\right)^{\wedge}1/2$$

$$V_s = 85.49 \times 0.84 \times 0.700509 \times \left(\frac{645}{24.78 \times 22.33}\right)^{\wedge}1/2 = 54.30$$

Where:

V_s = Average gas stream velocity, ft/sec.

85.49 = Pitot tube constant, $\text{ft/sec} \times \frac{(\text{lb/lb-mole})(\text{in. Hg})^{\wedge}1/2}{(^{\circ}\text{R})(\text{in } H_2O)}$

C_p = Pitot tube coefficient, dimensionless.

T_s = Absolute gas stream temperature, $^{\circ}R = T_s$, $^{\circ}F + 460$.

P_s = Absolute gas stack pressure, in. Hg. $= P_b + \frac{P(\text{static})}{13.6}$

delta p = Velocity head of stack, in. H_2O.

8. Average gas stream volumetric flowrate at actual conditions, wacf/hr.

$$Qs(act) = 3{,}600 \times Vs \times As$$

$$Qs(act) = 3{,}600 \times 54.300 \times 9.6211$$

$$= 1880745$$

Where:

Qs(act) = Volumetric flowrate of wet stack gas at actual conditions, wacf/hr.

A_s = Cross-sectional area of stack, ft^2.

3600 = Conversion factor from seconds to hours.

9. Average gas stream dry volumtric flowrate at standard conditions, dscf/hr.

$$Qs(std) = 17.64 \times Md \times \frac{P_s}{T_s} \times Qs(act)$$

$$Qs(std) = 17.64 \times 0.368 \times \frac{24.78}{645} \times 1880745$$

$$= 469396$$

Where:

Qs(std) = Volumetric flowrate of dry stack gas at standard conditions, dscf/hr.

10. Isokinetic variation calculated from intermediate values, percent.

$$I = \frac{17.327 \times T_s \times Vm(std)}{V_s \times O \times P_s \times Md \times (D_n)^2}$$

$$I = \frac{17.327 \times 645 \times 74.974}{54.30 \times 120 \times 24.78 \times 22.325 \times (0.375)^2} = 100.2$$

Where:

I = Percent of isokinetic sampling.

O = Total sampling time, minutes.

D_n = Diameter of nozzle, inches.

17.327 = Factor which includes standard temperature (528 °R), standard pressure (29.92 in. Hg), the formula for calculating area of circle D^2/4, conversion of square feet to square inches (144), conversion of seconds to minutes (60), and conversion to percent (100),
(in. Hg)(in^2)(min)
(°R)(ft^2)(sec)

11. Lead concentration, ug/dscm.

C_1 = W / (Vm(std) x 0.02832)

C_1 = 56.2500 / (74.974 x 0.02832)

= 26.4923

Where:

C_1 = Lead concentration, ug/dscm.

0.02832 = Conversion factor from cubic feet to cubic meters.

W = Weight of lead collected in sample, ug

12.Lead concentration, lb/dscf.

$$C_2 = \frac{W \times 2.2046\text{x}10\text{^-}9}{Vm(std)}$$

$$C_2 = \frac{56.25 \times 2.2046\text{x}10\text{^-}9}{74.974}$$

= 1.65E-09

Where:

C_2 = Concentraiton of lead, lb/dscf.

2.2046x10^-9 = Conversion factor from ug to lbs.

13. Lead mass emission rate, lbs/hr.

PMR = C_2 x Qs(std)

PMR = 1.65 x 10^-9 x 7823

= 7.76E-04

Where:

PMR = Lead mass emission rate, lbs/hr.

SAMPLE CALCULATIONS FOR HEXAVALENT CHROMIUM TEST

Client: RMA - SQI
Test Number: Run 1
Test Location: INCINERATOR STACK

Plant: DENVER, COLORADO
Test Date: 06-10-93
Test Period: 1130-1552

1. Volume of dry gas sampled at standard conditions (68 °F, 29.92 in. Hg), dscf.

$$Vm_{(std)} = \frac{17.64 \times Y \times V_m \times \left(P_b + \frac{\text{delta H}}{13.6}\right)}{(T_m + 460)}$$

$$Vm_{(std)} = \frac{17.64 \times 0.9923 \times 79.721 \times \left(24.79 + \frac{1.27250}{13.6}\right)}{87.80 + 460} = 63.388$$

Where:

$Vm_{(std)}$ = Volume of gas sample measured by the dry gas meter, corrected to standard conditions, dscf.

V_m = Volume of gas sample measured by the dry gas meter at meter conditions, dcf.

P_b = Barometric Pressure, in Hg.

delta H = Average pressure drop across the orifice meter, in H_20.

T_m = Average dry gas meter temperature , °F.

Y = Dry gas meter calibration factor.

17.64 = Factor that includes ratio of standard temperature (528 °R) to standard pressure (29.92 in. Hg), °R/in. Hg.

13.6 = Specific gravity of mercury.

2. Volume of water vapor in the gas sample corrected to standard conditions, scf.

$$Vw_{(std)} = (0.04707 \times V_{wc}) + (0.04715 \times W_{wsg})$$

$$Vw_{(std)} = (0.04707 \times 2255.0) + (0.04715 \times 58.0) = 108.878$$

Where:

$Vw_{(std)}$ = Volume of water vapor in the gas sample corrected to standard conditions, scf.

V_{wc} = Volume of liquid condensed in impingers, ml.

W_{wsg} = Weight of water vapor collected in silica gel, g.

0.04707 = Factor which includes the density of water (0.002201 lb/ml), the molecular weight of water (18.0 lb/lb-mole), the ideal gas constant 21.85 (in. Hg) (ft^3)/lb-mole)(°R); absolute temperature at standard conditions (528 °R), absolute pressure at standard conditions (29.92 in. Hg), ft^3/ml.

0.04715 = Factor which includes the molecular weight of water (18.0 lb/lb-mole), the ideal gas constant 21.85 (in. Hg) (ft^3)/lb-mole)(°R); absolute temperature at standard conditions (528 °R), absolute pressure at standard conditions (29.92 in. Hg), and 453.6 g/lb, ft^3/g.

3. Moisture content

$$B_{ws} = \frac{Vw_{(std)}}{Vw_{(std)} + Vm_{(std)}}$$

$$B_{ws} = \frac{108.878}{108.878 + 63.388} = 0.632$$

Where:

B_{ws} = Proportion of water vapor, by volume, in the gas stream, dimensionless.

4. Mole fraction of dry gas.

$M_d = 1 - B_{ws}$

$= 1 - 0.632 = 0.368$

Where:

M_d = Mole fraction of dry gas, dimensionless.

5. Dry molecular weight of gas stream, lb/lb-mole.

$MW_d = (0.440 \times \% CO_2) + (0.320 \times \% O_2) + (0.280 \times (\% N_2 + \% CO))$

$MW_d = (0.440 \times 10.10) + (0.320 \times 3.40) + (0.280 \times (86.50 + 0.00))$

$= 29.75$

Where:

MW_d = Dry molecular weight , lb/lb-mole.

$\% CO_2$ = Percent carbon dioxide by volume, dry basis.

$\% O_2$ = Percent oxygen by volume, dry basis.

$\% N_2$ = Percent nitrogen by volume, dry basis.

% CO = Percent carbon monoxide by volume, dry basis.

0.440 = Molecular weight of carbon dioxide, divided by 100.

0.320 = Molecular weight of oxygen, divided by 100.

0.280 = Molecular weight of nitrogen or carbon monoxide, divided by 100.

6. Actual molecular weight of gas stream (wet basis), lb/lb-mole.

$$MW_s = (MW_d \times M_d) + (18 \times (1 - M_d))$$

$$MW_s = (29.75 \times 0.368) + 18 (1 - 0.368)) = 22.32$$

Where:

MW_s = Molecular weight of wet gas, lb/lb-mole.

18 = Molecular weight of water, lb/lb-mole.

7. Average velocity of gas stream at actual conditions, ft/sec.

$$V_s = 85.49 \times C_p \times ((\text{delta p})^{1/2})_{avg} \times \left(\frac{T_{s(avg)}}{P_s \times MW_s}\right)^{1/2}$$

$$V_s = 85.49 \times 0.84 \times 0.649930 \times \left(\frac{643}{24.77 \times 22.32}\right)^{1/2} = 50.32$$

Where:

V_s = Average gas stream velocity, ft/sec.

85.49 = Pitot tube constant, ft/sec $\times \frac{\text{(lb/lb-mole)(in. Hg)}^{1/2}}{(^\circ R)(\text{in } H_2O)}$

C_p = Pitot tube coefficient, dimensionless.

T_s = Absolute gas stream temperature, °R = T_s, °F + 460.

P_s = Absolute gas stack pressure, in. Hg. = $P_b + \frac{P_{(static)}}{13.6}$

delta p = Velocity head of stack, in. H_2O.

8. Average gas stream volumetric flowrate at actual conditions, wacf/min.

$$Qs_{(act)} = 60 \times V_s \times A_s$$

$$Qs_{(act)} = 60 \times 50.32 \times 9.62$$

$$= 29047$$

Where:

$Qs_{(act)}$ = Volumetric flowrate of wet stack gas at actual conditions, wacf/min.

A_s = Cross-sectional area of stack, ft^2.

9. Average gas stream dry volumetric flowrate at standard conditions, dscf/min.

$$Qs_{(std)} = 17.64 \times M_d \times \frac{P_s}{T_s} \times Qs_{(act)}$$

$$Qs_{(std)} = 17.64 \times 0.368 \times \frac{24.77}{643} \times 29047$$

$$= 7266$$

Where:

$Qs_{(std)}$ = Volumetric flowrate of dry stack gas at standard conditions, dscf/min.

10. Isokinetic variation calculated from intermediate values, percent.

$$I = \frac{17.327 \times T_s \times V_{m(std)}}{V_s \times O \times P_s \times M_d \times (D_n)^2}$$

$$I = \frac{17.327 \times 643 \times 63.388}{50.32 \times 120 \times 24.77 \times 0.368 \times (0.354)^2} = 102.36$$

Where:

I	=	Percent of isokinetic sampling.
O	=	Total sampling time, minutes.
D_n	=	Diameter of nozzle, inches.
17.327	=	Factor which includes standard temperature (528 °R), standard pressure (29.92 in. Hg), the formula for calculating area of circle $D_n^2/4$, conversion of square feet to square inches (144), conversion of seconds to minutes (60), and conversion to percent (100), $\frac{(\text{in. Hg})(\text{in}^2)(\text{min})}{(^\circ\text{R})(\text{ft}^2)(\text{sec})}$

11. Cr^{+6} Concentration, ug/dscm.

$$C_1 = 35.31 \times \frac{C_t}{Vm_{(std)}}$$

$$C_1 = 35.31 \times \frac{0.3700}{63.388}$$

$$= 0.2061$$

Where:

C_1	=	Cr^{+6} concentration, ug/dscm.
Ct	=	Total Cr^{+6} catch, ug.
35.31	=	Conversion factor from cubic feet to cubic meters.

12. Cr^{+6} Concentration, lb/dscf.

$$C_2 = 2.205E\text{-}9 \times \frac{C_t}{Vm_{(std)}}$$

$$C_2 = 2.205E\text{-}9 \times \frac{0.3700}{63.388}$$

$$= 1.29E\text{-}11$$

Where:

C_2 = Cr^{+6} concentration, lb/dscf.

C_t = Total Cr^{+6} catch, ug.

2.205E-9 = Conversion factor from ug to lbs.

13. Cr^{+6} mass emission rate, lbs/hr.

$$CMR_t = C_2 \times Q_{s(std)}$$

$$CMR_t = 0.000000000013 \times 7266 \times 60$$

$$= 5.61E\text{-}06$$

Where:

60 = Conversion factor from lbs/min to lbs/hr.

CMR_t = Cr^{+6} mass emission rate, lbs/hr.

$Qs_{(std)}$ = Volumetric flowrate of dry stack gas at standard conditions, dscf/min.

RMA - SQI
DENVER, COLORADO
TRIAL BURN TEST PROGRAM
SUMMARY OF DIOXIN AND FURAN TOXIC EQUIVALENCY FACTORS

TEST DATA				
Test run number		1	2	3
Test location			INCINERATOR STACK	
Test date		06-10-93	06-11-93	06-12-93
Test time period	TE FACTORS	0745-1501	0710-1258	0756-1416
TOXICITY EQUIVALENCY EMISSIONS, lb/hr	(I-TEFs/89)			
2,3,7,8-TCDD	1	0	0	0
1,2,3,7,8-PeCDD	0.5	0	0	0
1,2,3,4,7,8-HxCDD	0.1	0	0	0
1,2,3,6,7,8-HxCDD	0.1	0	0	0
1,2,3,7,8,9-HxCDD	0.1	0	0	0
1,2,3,4,6,7,8-HpCDD	0.01	1.5E-12	0	1.5E-12
1,2,3,4,6,7,8,9-OCDD	0.001	2.9E-13	2.2E-13	5.1E-13
Total TCDD	0	0	0	0
Total PeCDD	0	0	0	0
Total HxCDD	0	0	0	0
Total HpCDD	0	0	0	0
		0	0	0
2,3,7,8-TCDF	0.1	1.5E-11	1.5E-11	0
1,2,3,7,8-PeCDF	0.05	0	0	0
2,3,4,7,8-PeCDF	0.5	0	0	0
1,2,3,4,7,8-HxCDF	0.1	1.5E-11	0	0
1,2,3,6,7,8-HxCDF	0.1	0	0	0
1,2,3,7,8,9-HxCDF	0.1	0	0	0
2,3,4,6,7,8-HxCDF	0.1	0	1.5E-12	0
1,2,3,4,6,7,8-HpCDF	0.01	1.5E-12	7.5E-13	0
1,2,3,4,7,8,9-HpCDF	0.01	0	0	0
1,2,3,4,6,7,8,9-OCDF	0.001	0	0	0
		0	0	0
Total TCDF	0	0	0	0
Total PeCDF	0	0	0	0
Total HxCDF	0	0	0	0
Total HpCDF	0	0	0	0
TOTAL 2,3,7,8-TCDD/TCDF EQUIVALENTS, lb/hr		3.27E-11	1.74E-11	1.98E-12

RMA-SQI
DENVER COLORADO
DRE TEST RESULTS
BASED ON 93% POHC PURITY

DRE TEST RESULTS			
	TEST RUN NUMBER		
	ONE	TWO	THREE
Carbon Tetrachloride			
Feed rate lb/hr	6.42	8.05	8.18
Emission rate lb/hr	ND<(8.26×10^{-5})	8.98×10^{-5}	ND<(8.92×10^{-5})
DRE (%)	>99.9987	99.9989	>99.9989
Chlorobenzene			
Feed rate lb/hr	8.05	8.35	8.18
Emission rate lb/hr	3.20×10^{-5}	ND<(8.58×10^{-5})	ND<(8.71×10^{-5})
DRE (%)	99.9996	>99.9989	>99.9989

The above calculated DRE is based on a POHC purity of 93% derived from the actual analyses of samples obtained from each POHC. The DRE is calculated as follows:

$$DRE = \frac{W_{in} - W_{out}}{W_{in}} \times 100$$

Where:

W_{in} = POHC mass rate in
W_{out} = POHC mass rate out (stack emissions)